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GOOD GOODS AND EXPORT

AUTHORITIES are agreed that America must soon regain and even extend its European trade, not merely that manufacturers may find an outlet for surplus production, but in order that American labor may be kept employed and the American standard of living may be upheld. Our international experts do not concur in opinion as to how trade resumption with Europe may best be effected. Some of the methods suggested are: An exchange of merchandise not unlike primitive bartering, extending credits and acceptances over a long term of years, making loans on foreign factories, and supplying cotton and other raw material to mills in war-torn countries to be made up into finished goods for sale here or abroad; and all in the hope of overcoming the money shortage and adverse exchange. There is still something else that America must do to retrieve and retain the great trade of Europe, and that is, as Secretary of Commerce Herbert Hoover has so strongly emphasized, it must meet its rivals in foreign markets with goods of unquestioned quality.

With regard to the quality of rubber goods exported by the United States, they are the same that find a ready market at home, and our people demand the best. Is not this constant claim that American goods are deficient in quality enemy propaganda?

RELIGION IN RECONSTRUCTION

HARVEY S. FIRESTONE, president of the Firestone Tire & Rubber Co., declares that the remedy for the recent business depression is spiritual rather than material. We must, he urges, not merely practice service and thrift, learn real values, buy necessary things to avert unemployment, and appreciate basic economic laws; but we must also contribute more earnest thought and honest effort to our work, "for only in this way can we keep in balance the three fundamentals of civilized progress—religion, agriculture, and manufacturing industry."

So remarkable an expression from a leader in American industry goes a long way toward dispelling the impression that business captains regard religion as a negligible factor. Mr. Firestone is but one of many industrial leaders who feel that it is quite as important for America to take reckoning of its spiritual as well as its commercial assets. Never so much as during the present reconstruction period was there so much need of developing a livelier moral enthusiasm, a loftier idealism, and a deeper reverence for the true principles of religion. This, with a more practical patriotism, a more intensive efficiency, a wider cultural development, and a more generous appreciation of the part played by labor, will solve all problems.

When President Harding, in taking the oath of office, kissed the Bible, he performed no merely perfunctory act. He but emphasized a fact that some of us may have overlooked in the stress of business, that American civilization is essentially religious and that to this influence may be directly attributed our great ethical progress and broadening benevolence. It is safe to say that in proportion as America cherishes its spiritual inheritance will its best traditions be perpetuated and the National Conscience and the Golden Rule be active and far-reaching forces in our countless activities.

AS TO COTTON PRICES

RUBBER MANUFACTURERS were not a little disconcerted last Fall at the virtually unanimous decision of the rubber planters to reduce acreage 25 per cent for thirteen months in order to offset a low, glutted market. Now they have something else, yet of a kindred character, to give them keen concern. It is the practically compulsory restriction of the cotton acreage in the United States to meet a condition not unlike that which has confronted the rubber raisers of the Far East. The time was in the

South, and more recently in the Southwest, when a farmer could not get credit unless he planted the greater part of his land in cotton. Today conditions are reversed. Credit is denied him unless he limits his cotton area to an almost irreducible minimum, so that there may be a better margin between cost and profit on the total value of all his products. Bankers who have been lending as high as $75 a bale on cotton that has been selling of late for $40 are determined not to be caught again with a big balance against them. Nor do they view with indifference a carry-over of nearly 10,000,000 bales, much of which might be thrown on the market at any time and break prices still further.

If cotton is to be financed it must be on a basis fairly profitable to those who lend money to plant and harvest the crop. Hence do they insist that the surplus of this staple be consumed before much more is raised. With a world-wide, reviving demand one thing is then practically as inevitable as death and taxes—cotton will get dearer. It may be that this will prove a handicap to some fabric manufacturers who had not the means or the foresight to stock up with cotton at its low price; yet a better price for cotton will eventually warrant a bigger production. This should help to stabilize both price and output, a condition rubber manufacturers will welcome. Indeed, so intimately related are the two lines, that it may truthfully be said that a demoralized cotton market is almost as detrimental to the rubber industry as a badly disordered market for crude rubber.

SELECTING WORKMEN BY PSYCHIATRY

MANY are the means adopted by mill managers in the hope of overcoming that bugbear of industry, the labor turnover, with its attendant waste of time in engaging and breaking in men and the spoiling often of much valuable material by raw recruits. Some of the methods employed in the selection of workmen have indeed yielded fairly good results and have helped much to lessen the loss referred to; but too many employers still rely upon methods for judging applicants for work that should be scrapped just as well as their worn-out machinery. Old, haphazard ways of "hiring and firing" are giving way to methods more scientific. The modern tendency is less chance and more choice in engaging men for service that wastage may be minimized and efficiency enhanced. With competition keener than ever, no plant now can afford to be burdened with a lot of industrial misfits.

To a considerable extent employment managers have, in dealing with applicants, contented themselves with getting references, studying their general physical appearance, and requiring them to fill out simple question cards. References are sometimes genuine and truthful facial contours often reveal strength, ability and desirable traits, and question blanks are usually filled out in a perfunctory manner. Indeed, more often than not candidates for jobs do not make any damaging admissions, such, for instance, as may disclose any moral or civic delinquency or reveal any nervous or mental handicap that might at once cause their rejection. The objection to most trade tests is that they do not go far enough. The margin of error in determining the job-seekers' potential usefulness is still too large, and there is less excuse for this now in the post-war period when man-power is relatively abundant than a couple of years ago when the bars had been deliberately left down in order to get any help at all.

In the examination of recruits for the Navy surprisingly good results have followed the introduction by Lieutenant A. W. Stearns, M. D., of a strictly psychiatric method of determining the fitness of applicants; and it is said that out of thousands of cases, it registered 95 per cent correct. A brief, exact, school, social, and medical history of each applicant is taken, apart from other applicants, by a trained observer, intent on getting vital, positive information; and it is said that almost unfailingly the mental test method reveals whether the applicant is vigorous, dependable, industrious, tractable, resourceful, and cooperative, or lacks fair health, is lazy and shifty, not amenable to discipline, or is unable or unwilling to learn.

There is no good reason why manufacturers should not avail themselves of the knowledge which physicians now have in order to select normal, contented, progressive workmen. The tactful putting of a few well directed questions may often mean all the difference between profit and loss.

MAY DAY BRINGS A LITTLE REVOLUTION IN THE RUBBER industry. Henceforth the standard golf ball must be made lighter for all tournaments. Its weight, according to the ruling of the highest authority, the Royal and Ancient Club of St. Andrews, London, must not exceed 1.62 ounces nor its diameter be less than 1.62 inches. Golf Champion Duncan says that it will make the play easier. At any rate, credit is given American players for insisting on the less ponderous "pill."

EVIDENCING THE FACT THAT THE RUBBER INDUSTRY has held its own remarkably well during the recent (and passing) general trade depression is the statement of the United States Chamber of Commerce that out of a total of 2,325,000 workers unemployed the maximum for the rubber industry was 50,000, or but one-sixth of the number of idle building tradesmen. Since the survey was made there has been a marked recovery in rubber manufacturing lines and a gratifying increase in the number of workers back at their jobs. A favorable augury, too, is the development of a better spirit of cooperation between employers and employed in all sections of the country, a condition largely brought about by tactful, humane, and progressive mill managers.

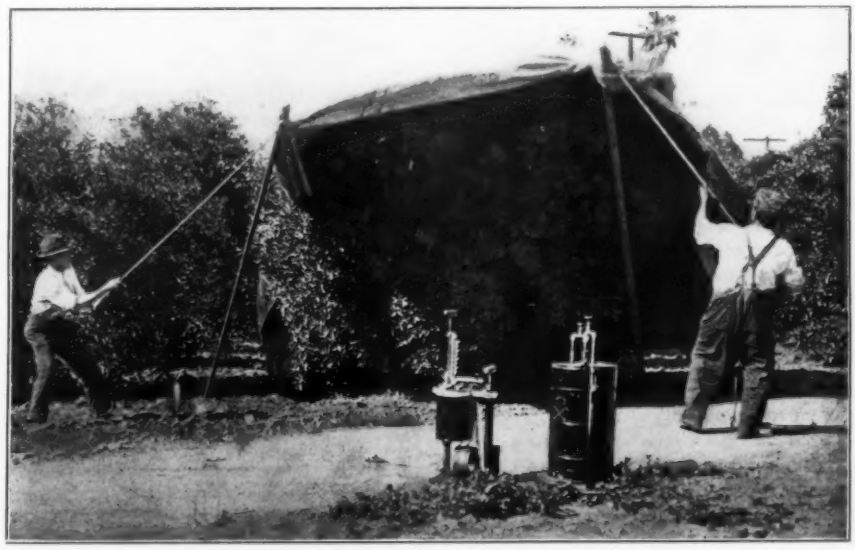
Rubber Tents in Tree Fumigation

Attempts to Control an Annual Loss of More Than a Billion Dollars by a New Use of Rubber

FEW REALIZE the constant fight that fruit growers and indeed all agriculturists wage against pests of a thousand and one kinds. Scale and boll-weevil are but two out of scores of common enemies that sometimes wipe out huge plantings. Gas fumigation, already practiced upon a large scale, has proved a wonderful success. And furthermore, the rubber, gas-tight, fumigation tent has arrived; and growers of oranges, lemons, grapefruit, and other citrus fruits, are predicting that it will soon supplant the old-time canvas covers, under which scale and other pests have been quite generally killed.

EVOLUTION OF THE RUBBER TENT

For twenty years the growers have sought in various ways to check one of the greatest drawbacks of the tent method—gas leakage through the cotton fabric; but even the application of a mucilage from boiled down cactus leaves mixed with linseed oil, as tried in the Southwest, has failed to make the fabric impermeable to the confined fumes. As the fumigant has to be used from one to three times a year, the item of leakage of valuable gas becomes important. Some growers discouraged by the cost, the trouble of tent erection, and the fact that fumigation had to be carried on almost entirely at night, even turned back to the almost discarded method of spraying with dry and liquid insecticides.



PLACING RUBBER GAS-TIGHT TENT OVER ORANGE TREES

An alert rubber man, George Hockensmith, an expert on balloon fabrics, had been studying the troubles of the citrus growers and he intimated several months ago to Professor H. J. Quayle, entomologist of the University of California Experimental Station of Riverside, California, that he could help to solve one of the growers' most trying problems, gas leakage. Encouraged by the entomologist, Mr. Hockensmith tried various kinds of materials and finally decided that a fabric, equivalent in strength to 8-ounce U. S. Army duck would best serve the purpose.

FABRIC TREATMENT, TENT CONSTRUCTION AND TESTS

The treatment given the material is similar to that which was given to balloons and dirigibles manufactured during the war, the fabric being not only rubberized and made perfectly gas-tight, but also given an aluminum color facing that makes the tent also opaque. The advantage of opacity is that fumigation may be carried on in the tents three or four hours before sundown. Experience with the plain canvas tents has proved that day fumigation gives decidedly inferior results to night work. For some reason not yet explained, sunlight on plain canvas tents during the fumigation of trees with liquified hydrocyanic-acid gas often causes peculiar injury to fruit and leaves. Hence the practice of doing most of the "gassing" after sundown. It is claimed that the new rubberized cloth tent will effectually bar out the actinic sun rays which are believed to do the mischievous work with the gas, thus making the long-desired daylight fumigation feasible.

The new rubber tents are octagonal in shape, the center being made of the heavy material and the wings or sides of a coated fabric about three ounces lighter to the yard. Such construction not only makes the tent lighter, but also more convenient to handle in the field. As might be expected, the initial cost of the rubber tents is more than that of the plain canvas affairs, but the advantages of the rubber tree cover are so great, it is claimed, that the higher cost is easily offset.

A severe test not only of the efficiency of the tents in retaining gas, but of their durability, was given recently at Corona, California, where they were used in fumigating 1,000 newly-pruned Lisbon lemon trees. The tents were given the equivalent of two years' wear and tear in a few days' time and showed no visible defects after all the rough handling, as attested by members of the Growers' Cooperative Fumigating Association of that place.

STANDARD FUMIGATION METHODS POSSIBLE

Standardization of fumigation is the goal for which economic entomologists have long been striving, and they feel that in the rubber tent their hope will at last be realized. Standardization was impossible with such a variable factor as gas-leakage, possible always with the porous sail-cloth and often influenced by weather conditions. To hold a definite amount of gas for a definite period is the very basis of fumigation, and these two essentials are quite obtained, it is said, by Professor Quayle, in the use of gas-tight tenting material. Exact dosage, not merely to get results but also to insure the tree's safety from injury by excess gas, or overexposure, as has so often happened, can now be achieved. Moreover, it is claimed, with gas-tight tents the dosage for small trees may be reduced two-thirds; of average sized trees, one-half; and very large trees, one quarter. In addition, the time of exposure may be reduced from about an hour to an average of thirty minutes.

It is necessary, too, for trees to be kept dry during fumigation. Plain canvas tents often allowed dampness to reach the fruit and foliage, and when the dry gas (liquified hydrocyanic acid) unites with the moisture, serious damage may be done to the tree. Under a rubber tent the tree may be entirely safeguarded from dampness as well as wind, which also interferes to some extent

PLANT AT AZUZA, CALIFORNIA, FOR THE MANUFACTURE OF HYDROCYANIC ACID, USED IN TENT FUMIGATION

with fumigation. Even in covering time, it is claimed that 50 per cent saving can be effected with rubber tents.

SUPERIORITY OF GAS FUMIGATION

One of the advantages of gas as an insecticide and fungicide is, that it is not only quick and certain, but, if properly used, it will disappear when the tent is removed and harm neither the tree nor the fruit. Spraying mixtures, on the other hand, cannot be diffused through dense foliage and often fruit is affected by the chemicals, cases of arsenical poisoning having been attributed to such a cause. A fumigated tree, it has been found, produces cleaner, bigger, better fruit, with better color and flavor, than one which has been merely sprayed. While some growers still generate their own gas, most of it is prepared by fumigating companies and delivered in metal drums to the groves. The gas is then forced under high pressure through a hose leading under the tent and issues from an atomizer, the amount being graduated by registering apparatus.

THE GENESIS OF HYDROCYANIC ACID

A word about hydrocyanic acid (HCN) may not be amiss. It is the prussic acid of the old chemistry, and very poisonous. It is a colorless, mobile, volatile liquid with a peculiar peach-blossom odor. It is, when vaporized, much lighter than air and diffuses rapidly. On a small scale it is made by the action of one fluid ounce of sulphuric acid (sp. gr. 1.83) on one ounce of cyanide of soda. Pure acid is produced by passing hydrogen disulphide gas over dry mercuric cyanide. Its boiling point is 26.5 degrees C. It is interesting to learn that hydrocyanic acid has been found in the latex of rubber trees. R. T. Stokes in *Chemical Abstracts*, volume 9, page 2607, tells of an analysis of the latex of *Hevea brasiliensis* by M. Kerbosch in which the presence of HCN was proved by its reaction with Prussian blue. It is conceivable that to some such substance the latex may owe the power it is believed to possess of safeguarding the tree from attacks by insect enemies.

USEFULNESS OF RUBBER TENTS UNLIMITED

Perhaps, too, the day is not far distant when two substances found in the latex will play an important part in saving rubber from damage by pests. Rubber, gas-tight tents may be used for fumigating the younger trees, and giving their insect enemies a proper dosage of hydrocyanic acid. Apparently there is practically no limit to the usefulness of the rubber fumigating tent. It may be used to rid the date-palm trees of suckers, to save the peach crop, the prune, pear, apricot, and many other fruit and berry crops, and in many ways to lessen the loss, estimated for 1920 at a billion and a half of dollars, due to the ravages of scales, flies, beetles, moths, aphids, caterpillars, etc., on the products of the country's farms, gardens and orchards.

Curing Tires in Melted Metal Molds

The Stone Process and What It Covers—The Gleason Fusible Metal Core—The Eatin Patent

STEEL MOLDS AND CORES for tires, footwear, druggists' sundries, etc., as well as vulcanizing presses and similar machinery in which manufacturers of rubber goods have invested millions of dollars will all be scrapped, and vulcanizing time cut almost in half, if the hopes of Dr. Frank O. E. Stone are realized. Dr. Stone is a young dentist, formerly of Akron, Ohio, who, after much experimenting in rubber and metals, has patented a method[1] of curing rubber by immersion in low fusible metals.

Dr. Stone claims that he can completely eliminate molds in making rubber goods, overcome variations in the physical condition of raw and cured rubber, obtain more definite results in vulcanizing than by using steam, and avoid overcuring and bloom in the goods. The inventor claims that the amount of sulphur and accelerators ordinarily used in vulcanizing, can be reduced, and the toughness, resilience, and flexibility of cured rubber, considerably increased. Tire casings can be cured in 50 minutes, air-bags wholly dispensed with, and a closer adhesion of rubber to fabric secured. In making solid tires oxidation is eliminated and closer adhesion of rubber and metal secured as steam and hot water would be dispensed with. Rubber manufacturers, therefore, would be able to make a wider range of articles that are now made of other materials, and the labor cost would be reduced, generally speaking, 30 per cent.

THE STONE PROCESS

Applied to tire-making, the method is as follows: A casing, having been built up on a tire core, is suspended or supported in a metal trough into which fusible metals at a liquefying temperature are poured so as to completely envelop the casing. The metals are then allowed to solidify. By means external to the trough, or with an electric resistance coil within the trough, the fusible metals are kept steadily at a vulcanizing temperature until the cure is effected. The metals are then allowed to cool, when they are liquefied, poured off, and the casing removed from the trough to be finished in the usual manner.

Pressure is obtained by contraction of the liquefied metals as they cool around the article they encase, from the fusing point

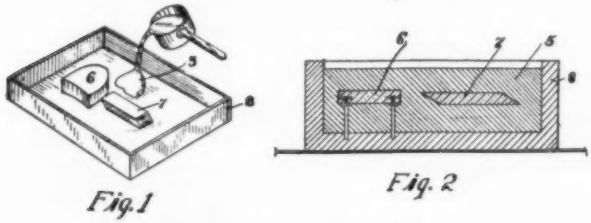
[1] United States patent No. 1,368,071 granted February 8, 1921.

to the vulcanizing temperature. It is said that a vulcanizing temperature much lower than that ordinarily used can be employed satisfactorily with this process. The fusible metals employed are in the form of an alloy, commonly lead, tin, and bismuth, to which antimony or cadmium is sometimes added. One of these alloys, known in chemistry as Lipowitz', is composed of bismuth 50, lead 27, tin 13, and cadmium 10 per cent, and it melts at 140 degrees F.

The various metallic combinations are remarkable for the pressure they can withstand, for breaking with a clean fracture, for their hardness, and the sharpness of their castings.

The first impression of those who have not tried molding rubber in fusible metals is that the alloys liquefied by heat would burn the rubber, but this fear is dispelled when celluloid does not ignite when imbedded in the molten mass or when one's fingers are thrust into the hot flowing metal without injury. The metals may be used indefinitely, the first cost being the only one.

Dr. Stone is now giving his attention to the mechanical aids required in vulcanizing by the new process, such as the troughs or containers for the curing metals, pressure and temperature-controlling devices, electric heating arrangements, etc. He also states that he has perfected a process for making seamless inner tubes with the fusible metals.



STONE FUSIBLE METAL MOLD

Referring to the accompanying illustration of Stone's method, Fig. 1 shows a container with a rubber heel and eraser in position, and the method of pouring the molten metal. Fig. 2 is a cross-section of the container with the rubber articles embedded in metal.

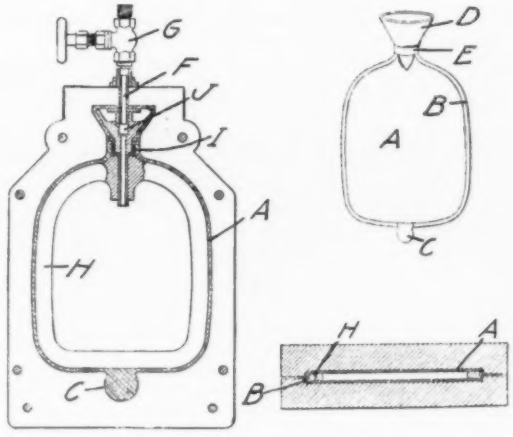
Any low fusible substance may be employed, preferably one composed of two or more metals intimately united, the ratio of the composition varying in accordance with the degree of heat at which fusibility is desired. The rubber heel 6 or the eraser 7 are preferably preformed and placed in a container 8, the metal 5 is subject to heat and liquefied, whereupon it is poured over and around the articles, as shown in Fig. 1. The metal is then allowed to solidify and the articles are firmly embedded in solid metal. The heat is next applied and the metal is kept at the vulcanizing temperature for the time required. The metal is then allowed to cool, when it is liquefied and drawn off.

It is difficult for one familiar with the rubber business to evolve anything wholly new, and it is almost impossible for others to do so. Dr. Stone is doubtless perfectly sincere, and in calling fresh attention to fusible metals in rubber molding he may have done the industry good, but to us the novelty is not apparent. Take for example the Gleason patents for fusible cores for water bottles, inner tubes, etc.

GLEASON'S FUSIBLE CORE MOLD

Gleason's water-bottle mold employs a rigid mandrel or core of soft metal which melts at a temperature below that destructive to rubber. During vulcanization the inner wall of the water bottle is sustained, first by the fusible core and when that melts, by compressed air or gas. The illustration shows a plan view of the lower half of the mold, a cross-section of the mold, and the complete bottle.

The bottle is formed by assembling the two main pieces *A*, the edging *B*, the tail piece *C*, neck *D*, and collar *E*. *F* is a tube connecting the valve *G* with the interior of the water bottle. The fusible core *H* is a narrow, open band, which conforms in shape and thickness to the interior of the unvulcanized bottle. The core is connected with a non-fusible piece *I*, which constitutes the nipple of the finished bottle and becomes attached to the rubber during vulcanization. It is also connected to the non-fusible part *J*, which forms the funnel of the bottle.



GLEASON'S MOLD AND COMPLETE WATER BOTTLE

When the various parts are assembled in the mold and the core is in place, the mold is clamped together and heated to 250—285 degrees F. Vulcanization proceeds inward from the exterior. The fusible core melts before the bottle is entirely cured, and the molten metal is drawn out through the tube *F*. The bottle may be expanded during the final stage of curing, by compressed air or by gas from a volatile liquid introduced through the tube *F*.

THE EATIN PROCESS

Fusible cores are, to be sure, not what Dr. Stone claims, so we cite for his attention the Eatin British patent No. 2637, issued November 21, 1859, for curing india rubber compound. Briefly it is thus explained. "The process consists in the use of a metallic bath for the purposes of vulcanization, so constituted as to fuse at or below the lowest degree of temperature required in vulcanization and capable of being elevated readily to the highest temperature required in the process. The preparations of india rubber and sulphur immersed in such a bath when at its fusing point are thoroughly vulcanized in from two to five hours, according to the temperature maintained.

"The composition of this bath may be varied to meet any required case. It will be well usually to make use of an alloy, 50 parts of bismuth, 31 of lead, and 19 of tin, fusing at about 203 degrees F. When the articles will bear a higher temperature than 212 degrees F. in the early stage of the process a bath of higher fusing point may be used by increasing the proportion of tin and lead and by the addition of zinc or other metal"

MOTOR TRUCKS IN THE TEXTILE INDUSTRY

Reports received from 414 textile mills located in various parts of the country show that approximately half of the firms use motor trucks. Of this number 153 actually owned trucks, while about 20 per cent more have their trucking done on contract. Reports indicate there is more work for light trucks of less than 1½-ton capacity, and that more than 60 per cent of the trucks are three tons or less. Relating to the tire equipment, there were 140 reports; 117, or 84.5 per cent, were using solid tires while the other 23, or 16.5 per cent, reported pneumatics in use.

The American Chewing Gum Industry

Origin and Extent of the Industry

THE CHICLE CHEWING GUM BUSINESS forms an interesting chapter in American industrial development. Its beginning dates back less than 60 years.

Previous to that time those who chewed gum used for the purpose lumps of native spruce resin or preparations of sweetened paraffine wax and oil-softened resin sold in the form of convenient sticks.

American Chicle Co.

FIG. 1. PLANT OF THE AMERICAN CHICLE CO., LONG ISLAND CITY, NEW YORK.

The American habit of gum chewing is rapidly extending in other countries, notably among the populations of the South American countries, Australia, New Zealand, and in lesser degree in England and France. It is authoritatively reported that the output of chewing gum was greater in 1920 than in any previous year, the weight of the finished product being estimated at 40,000 short tons.

The use of chewing gum is regarded as a harmless relief for nervous tension, making concentration of attention easier, and for that reason the United States War Department ordered chewing gum listed as a ration and distributed to American soldiers during the European war. This fact served to advertise and extend the habit of its use among the peoples of England, France and Belgium.

In 1860 Thomas Adams recognized the perfect suitability of chicle as a base for chewing gum and he began manufacturing the first chicle gum on a total investment, it is reported, of $55. The product at once became popular because chicle not only chews easily and satisfactorily but compounds readily with sugar and flavorings into a pleasant confection.

In its half-century of growth the chicle chewing gum industry has made phenomenal progress and at present ranks among the big American industries. The manufactured output in 1920 was valued at $57,000,000, representing a retail business of $100,000,000. By resort to well-planned advertising methods the sale of chewing gum is being converted from a seasonal to an all-year business.

The success of the company that originated this industry subsequently led to the formation of the American Chicle Co., the most extensive chewing gum organization in the world. This company imports over three-quarters of the chicle entering the American market, which is practically the only one for chicle. Collections are made from the company's forest concessions of 5,000,000 acres in Southern Mexico, Guatemala and British Honduras.

Table I gives the importations of crude chicle into the United States by fiscal years from 1906–1907 to 1920. Practically the total supply is utilized by the American chewing gum industry. The supply, however, has in recent years been inadequate to meet the demand and prices have increased, although at present the price has receded from the high level. These conditions led to the exploration for new areas of forest in search of chicle-bearing trees, and may ultimately lead to a chicle plantation industry.

TABLE I

UNITED STATES IMPORTATIONS OF CRUDE CHICLE

Fiscal Year	Pounds	Fiscal Year	Pounds
1906-1907	6,732,581	1914-1915	6,499,664
1907-1908	6,089,607	1915-1916	7,346,969
1908-1909	5,450,139	1916-1917	7,440,022
1909-1910	6,793,821	1917-1918	6,408,093
1910-1911	6,508,208	*1918	4,645,761
1911-1912	7,782,005	†1919	9,445,538
1912-1913	13,758,592	†1920	9,859,788
1913-1914	8,040,891		

*July 1 to December 31.
†Calendar year.

CHEWING GUM INGREDIENTS

CHICLE

Chicle is a resinous gum derived from the milky latex of the Nispero (*Achras sapota*), an evergreen tree which grows abundantly in the warm, damp forests of Southern Mexico, Yucatan, Central America, British Honduras and adjacent South American countries. Some interesting authoritative information on the chicle industry has recently been published[1] from which the botanical data and the information on collection and preparation is quoted.

FIG. 2. ACHRAS SAPOTA, LEAVES, FRUIT AND SEEDS

Although the bulk of the world's supply of chicle comes from Mexico and British Honduras, nearly all the central and tropical South American republics are chicle producers, several of the latter having come into prominence only during the last few years.

While the true chicle is produced by the Nispero tree, the chicle exploited in Colombia is derived from a different source, as is probably also that obtained in the neighboring republics. The exact botanical origin of the Colombian chicle is a matter of some doubt, but it appears to be a species of Couma. This genus belongs to *Apocynaceæ*, a family containing many economic plants of importance, including several rubber-yielding trees and vines.

The botanical source of chicle in the different South American countries is apparently not known, but it is not improbable that the tree may be a species of Couma, as the Colombian chicle tree appears to be.

As compared with the Mexican chicle, the Colombian contains more resin and less gutta, namely, 83.2 per cent resin and 5.5 per cent gutta in the wet material, as against 44.8 per cent resin and 17.2 per cent gutta in the Mexican material. The Colombian product is therefore inferior to the Mexican, and when used in the manufacture of chewing gum, is mixed with the latter.

[1] Chicle. By M. T. Dawe, F. L. S. The Rubber Age, London, December, 1920, 452-454.

According to the United States *Commerce Reports* for June, 1920, the total exports of chicle from Colombia for the year 1918 amounted to 690,496 pounds, about half of which came from the Sogomoso river region of the Magdalena Valley.

Collection and Preparation

The resiniferous latex from which chicle is prepared occurs in the bark of the tree, and is obtained by tapping in much the same way as rubber or balata. Incisions are made in the bark, usually in V-shaped form, a long knife known as a *machete* being used for the purpose. The outfit of a chicle collector, or *chiclero*, consists of a *machete*, a rope for climbing the trees, and receptacles for collecting the latex.

American Chicle Co.

FIG. 3. TAPPING THE TREE

FIG. 4. COLLECTING THE LATEX

A series of these V-shaped incisions are made and usually connected by a vertical channel, down which the latex readily flows into receptacles placed to receive it. Fig. 4 shows the arrangement of tapping cuts and a canvas bag attached to the tree trunk as a latex receptacle. Canvas bags are preferred for this purpose because they admit of baling in large numbers, thus occupying the minimum space for mule-back transportation.

The latex is conveyed to collecting camps, where it is boiled down in large vessels to a dough-like consistency, then it is kneaded to remove some of the water, and pressed in wooden molds for exportation. The largest quantity of the gum is produced in the southern states of Mexico, particularly Yucatan. The gum as shipped from Mexico contains about 50 per cent of water. On arrival in New York it contains around 40 per cent water. The latex, when fresh, resembles cow's milk, but when coalesced by boiling, it assumes a grayish hue, though the color may vary owing to the admixture of impurities. The latex is sometimes adulterated with the milk of other trees. In Mexico, the best chicle is said to be produced by trees grown in the higher altitudes. The tree yielding chicle grows to a height of from 40 to 50 feet, with trunk from 35 to 40 inches in diameter. Each tree yields, on an average, 30 to 35 pounds of chicle per year. The trees are tapped throughout the year with the exception of the rainy period, which lasts from three to four months. The tree requires a good loamy soil and a rainfall of about 90 inches.

Appearance

Crude chicle is quite hard, brittle and easily reduced to fragments. It varies according to purity, from a light to a dark brown color and melts very readily with heat, being easily softened when held in the mouth. When warm it is very ductile and adhesive without perceptible odor or taste, and is entirely free from any injurious qualities.

Analysis of Crude Yucatan Chicle[2]

	Per Cent
Acetone soluble resins	40.0
Gutta and hydrocarbons	17.4
Proteins	0.6
Sand and foreign matter	2.3
Water	35.0
Mineral ash	4.7

[2] Dr. Frederic Dannerth, Journal of Industrial and Engineering Chemistry, 1917, page 679.

CHICLE SUBSTITUTES

A number of gums are regularly cleaned and blended as substitutes for chicle and are largely used. The ingredients of these substitutes are the low-grade rubber from Borneo known as Pontianak or jelutong and the inferior guttas, among them being gutta siak, gutta kay, etc.; also the Pontianak resin extracted from jelutong as well as waxes, resins and balsams of various sorts. Several chicle substitutes have been patented and others pass under special trade names.

The aggregate tonnage of these compounded gums annually employed in the manufacture of chewing gum, approximately equals or perhaps exceeds that of the pure chicle used. Comparatively little chewing gum is made of a strictly chicle base and much is made containing no chicle whatever.

Methods of Making Chicle Substitutes

There are various processes and machines for the purification of guttas, resins and low-grade rubber for use as substitutes for chicle and for chewing gum manufacture, some of which have been patented.

Cleaning Crude Pontianak

James D. Darling, of Philadelphia, patented the following methods:

Comminuted crude Pontianak, or jelutong, is boiled in a receptacle for a considerable time in an alkaline solution consisting of 25 pounds of caustic soda to 100 gallons of water. The boiling is continued until all the impurities are precipitated, while the mixture of rubber and resin, purified and changed in physical characteristics, floats as a spongy mass. When freed from the alkaline liquor this mass is odorless and tasteless, but still somewhat tough and resilient. This product is removed and after repeated washings is subjected to a pulling or kneading operation by which its physical qualities are further changed.

During this treatment the material is maintained at a temperature between 200 and 300 degrees F. for a considerable time until the rubber content loses its toughness and resiliency and the whole mass becomes plastic, tenacious and extremely ductile, with little or no resiliency, and suited to the manufacture of chewing gum.

Treating Pontianak Resin and Gutta

Pontianak resin and low-grade guttas contain either an objectionable taste, or odors and poisonous substances which must be removed before the material can be used in making artificial chicle. It has been found that these faults may be removed by using sugar in solution.

The crude materials are dried and powdered in a mill in the case of the resin or in a hollander in the case of the gutta and the finely divided materials are then boiled in a five per cent sugar solution. The cleaned products are washed and dried by suitable means. Thus treated, they are sufficiently pure to be used, being free from taste, odor, etc.

Chicle substitutes are deficient in plasticity, and tougher and more elastic than true chicle; therefore they do not chew as easily and smoothly. These features, however, are obviated in compounding the chewing gum mixture. Practically no chewing gum is now made in which chicle is not largely or even wholly displaced by some combination substitute. Certain large gum manufacturers prepare their own substitute, others depend on purchase from concerns regularly engaged in cleaning and blending materials for the purpose.

CARAMEL PASTE

In order to obviate the naturally stiff and springy quality inherent in chicle substitutes a material known in the trade as "paste" is used. In physical appearance and consistency this much resembles ordinary yellow caramel candy. Oleo stock is one of its principal ingredients, the effect of which is to soften the chicle substitute and render it more plastic and less elastic, consequently more agreeable to chew. Other functions of paste are to act as a binder for the powdered sugar in the gum mixing and as a preservative against aging or hardening of the finished product by drying.

GLUCOSE

Glucose is familiar as corn syrup, a thick, transparent, heavy liquid of sweet taste, although less sweet than sucrose or ordinary cane sugar. Glucose syrup contains from 40 to 50 per cent of dextrose, from 30 to 40 per cent of dextrin, and water.

In chewing gum mixing glucose syrup serves as a binder and solvent for the dry sugar, thus permitting the easy incorporation of the large proportion of the latter in the mixing.

SUGAR

Pure, refined, white XXXX powdered sugar is the chief compounding ingredient in chewing gum. It also is freely used for dusting the gum as it is handled in the machines, on conveyors and on trays for cooling.

The same grade of sugar is also used to make the thick syrup for coating gum balls, "chiclets" or "nuggets" by the process employed for sugar coating in various forms of confectionery.

COLORS

While sugar-coated forms of chewing gum are generally left white it is a common practice to color the surface of ball gum. The colors used are: licorice for black; chocolate for brown; turmeric for yellow and certified harmless colors allowable in food products for red, green, etc.

FLAVORING

The various flavorings employed are a very expensive feature of chewing gum manufacture. Some are synthetic and others natural, as for example, the oil of mint. Special storage is set apart for safe keeping of the flavoring extracts in a gum factory because of their high value. In the larger plants the stock of flavoring extracts frequently amount to several hundred thousands of dollars.

MEDICAMENTS

Naturally the medicaments used in chewing gum are very few. The list includes pepsin, listerine, licorice and possibly some others. The amount of medication possible in a stick of chewing gum is too limited to be practical.

CHEWING GUM FORMULAS

TYPICAL FORMULA

Chicle	14
Chicle substitute	14
Caramel paste	1
Glucose	14
Powdered sugar, XXXX	57
	100

Flavoring extract as required.

CHICLE GUM FORMULA

Gum chicle, 3½ pounds; paraffine wax, 1 pound; balsam tolu, 2 ounces; sugar, 12 pounds; water, 3 pints; flavoring.

By the aid of heat, dissolve the sugar in the water and boil to the "crack" degree, so called by confectioners; pour the resultant syrup upon an oiled slab; add the chicle, paraffine wax and balsam tolu, all melted together, and mix thoroughly. This manipulation produces a tough plastic mass which after addition of the flavoring may be cut into the desired form.

PARAFFINE GUM FORMULA

Paraffine is dissolved at a gentle heat with a small amount of sweet oil and glycerine, the amount of each depending upon the season, less being required in warm than in cold weather. The gum (Peruvian balsam, liquid amber or whatever gum desired) is then added and stirred in until the mass becomes homogeneous. Next, add white powdered sugar, stir in, and finally add the flavoring desired. The mass is then poured on a candy slab, rolled into sheets and cut to size.

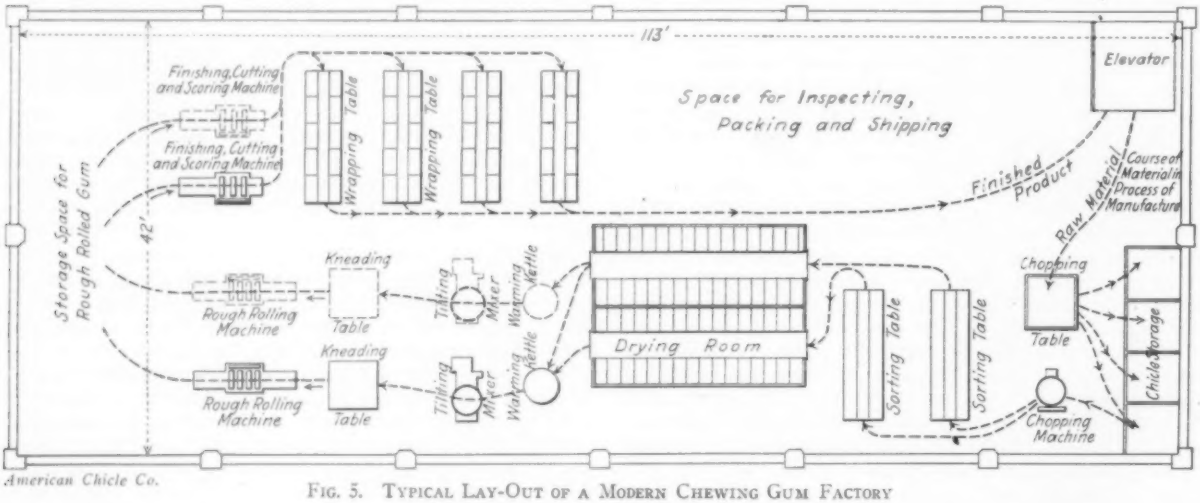
MANUFACTURE

Although the great bulk of the chewing gum trade is concentrated with a few well-known concerns the total number of gum manufacturers in the industry is said to somewhat exceed 200.

Various special machines are required in gum manufacture, some of which are heavy and expensive. Automatic machinery is much used, particularly in packaging the goods where the output is considerable.

TYPICAL CHEWING GUM PLANT

A typical lay-out for a small gum plant is shown in Fig. 5.



American Chicle Co.

FIG. 5. TYPICAL LAY-OUT OF A MODERN CHEWING GUM FACTORY

The arrangement of equipment is that of two parallel units to admit doubling the capacity when required. The course of the material through the manufacturing processes is indicated by arrows. In such a plant as that indicated much hand labor would be employed and only the essential machinery would be found. The largest plants of course contain many special and automatic machines and an elaborate air-conditioning installation for the drying, cooling and packaging departments.

TENNIS BALLS CANNED FOR EXPORT

Imported "canned" tennis balls have a real playing advantage over balls shipped otherwise; in the opinion of tennis players in Shanghai, China. When manufacturers learned that tennis balls were affected by moisture during the long voyage, thereby losing much of their resiliency, they began to pack balls for shipment to the Far East in hermetically sealed cans. It is believed that such canning has a good effect and that balls so protected were the determining factor in winning this year's singles tournament in Shanghai.

A Glossary of Words and Terms Used in the Rubber Industry—V[1]

By Henry C. Pearson

PLANTATION RUBBER—Continued

GOOD DARK BROWN CRÊPE. Thick or thin. A New York term for low grade crêpe. See Crêpe.

GRADING. The selecting or classifying of rubber with regard to market values.

GOOD SMOKED SHEET. A general term for fair grade smoke-cured rubber. See Sheet.

IPOH. A Singapore sub-grade of unsmoked sheet rubber comparing well with types *A* and *B* blanket crêpe with regard to strength but shrinking about 8 per cent on an average. Takes its name from the district in which it is produced. See Sheet.

KLANG. A Singapore sub-grade of unsmoked sheet named after the Malayan district in which it is produced. A strong rubber of the *A* and *B* blanket crêpe types, with a shrinkage ranging from 5 per cent to 8 per cent. See Sheet.

KUALA KANGSAR. Rubber named after the Malayan district of that name. See Sheet.

KUALA LUMPUR. Rubber named after the Malayan district of that name. See Sheet.

LACE. A very thin open sheet. Has been superseded by crêpe.

LIGHT AMBER CRÊPE. See Crêpe.

LUMP.—A Batavian term for rubber which has been coagulated in the cups, or has become coagulated on the way to the factory, or rubber which had coagulated ahead of time at the factory. See Crêpe.

MALACCA. A Singapore sub-grade of unsmoked sheet named after the Malayan district of that name. In two qualities, dry and wet, the latter seldom coming to market. The dry runs from a good pale color to brown and will crêpe to form types *A* and *B* blanket crêpe of about the same color as the original sheet. The wet sheets or mixed Malacca sheet are dark and make a good, firm type of *C* blanket crêpe, with 3 to 5 per cent shrinkage. See Crêpe.

MASSED OR ROLLED CRÊPE.. New York term for earth crêpe See Crêpe

MEDIUM COLOR BROWN CRÊPE. Thick or thin. A New York term for a medium grade of crêpe. See Crêpe.

MEXICAN PLANTATION. See Castilloa.

MIXED MALACCA. See Malacca.

MOTTLED CRÊPE. A New York term for No. 4 amber. See Crêpe.

MOULDY RUBBER. Rubber that is surface stained or spotted with fungus growths.

MUAR. A Singapore sub-grade of unsmoked sheet named after the district producing it, medium brown in color, but growing darker after crepêing and drying, strong but inclined to soften. Shrinkage 8 per cent. See Sheet.

MACHINE-SMOKED SHEETS. Thin layers of rubber latex that have been smoked in a machine, coagulation being effected after the manner of the Brazilian "smoke cure."

MANIHOT CRÊPE, SHEET AND SCRAP. See Ceará.

NORMAL LATEX. Undiluted latex with a dry rubber content of 30 per cent.

NEARLY-CLEAN DARK BROWN CRÊPE. A grade of bark rubber. See Crêpe.

OFF-COLOR CRÊPE. A Batavia grade of crêpe made from latex that is diluted with rain water. See Crêpe.

OFF-COLOR LATEX. New York term for a grade of crêpe. See Crêpe

OFF-QUALITY RIBBED SMOKED SHEETS. A Singapore and Batavia term for a grade of smoked sheet. See Sheet.

OFF-STANDARD LATEX CRÊPE. A New York term for off-color latex. See Crêpe.

OVER-SMOKED. A tarry condition of rubber due to oily fuel.

PAPUA. Plantation Hevea from the island of that name.

PENANG SHEET. A Singapore sub-grade of unsmoked sheet named after the producing district, dark and strong. When crêped, makes a good type of *C* blanket crêpe. See Sheet.

PHILIPPINE PLANTATION. See Plantation Pará.

PLAIN SMOKED SHEETS. A Singapore term for a grade of smoked sheet. See Sheet.

PLANTATION PARÁ. A general term applied to rubber grown in the Far East from the cultivated *Hevea brasiliensis*, the product being usually named after the districts supplying it as: "Ceylon," "Malay," "Straits," "Java," "Sumatra." This rubber also comes in a less degree from Africa, Dutch and British Guiana, Trinidad and the Philippine Islands, and the grades bear the names of the country of origin.

PLANTATION SMOKED SHEETS. Rubber which, after coagulation with acetic acid, has been cured and dried in the smoke-house.

PLANTATION RUBBER. A general term for all cultivated rubber, chiefly that derived from the Hevea, but also including planted Castilloa, Manihot, Ficus, Funtumia, etc.

PRIME, CLEAN, LIGHT BROWN CRÊPE. A New York term for a medium grade of crêpe. See Crêpe.

PRIME PALE CRÊPE. A Java term for the highest grade of crêpe. See Crêpe.

PRIME RIBBED SMOKED SHEET. A Batavia term for a high grade smoked sheet. See Sheet.

RIBBED SHEET. A Singapore term for a high grade sheet. See Sheet.

ROLLED BARK CRÊPE. A Singapore term for a low grade crêpe. See Crêpe.

ROLLED CRÊPE. A New York term for low grade crêpe. See Crêpe.

RAMBONG CRÊPE. Ficus rubber machined like plantation Pará.

SMOKED SHEET No. 1. East Java term of prime ribbed sheet. See Sheet.

SMOKED SHEET No. 2. A New York term for plain smoked sheet. See Sheet.

SMOKED SHEET. See Sheet.

SHEET. A grade of plantation rubber nearly equal to the best grades of crêpe, the chief difference being its physical shape. Most of it is smoked, although some comes to the market as the unsmoked. A further difference is made between that which is ribbed or has diamond shaped markings from the washing-rolls and that which is smooth. The first New York grade is known as ribbed smoked sheet; in Singapore as standard quality ribbed smoked; in Batavia, prime ribbed or diamond smoked; and in East Java as No. 1 smoked. The second grade is known in Singapore and Batavia as off-quality ribbed smoked; and East Java as No. 2 and No. 3 smoked. This grade is followed in New York by standard quality smooth smoked; in Singapore as smooth smoked. The unsmoked is known in New York as standard quality unsmoked sheet; in Singapore as clean dry pale amber and light brown unsmoked sheet. These are grades in which there is much variation, as they are often from small native plantations and usually bear the names of the localities from which they come. Such as Bjambi, Batu, Pahat, Ipoh, Klang, Kuala Kangsar, Kuala Lumpur, Muar, Penang, etc.

SMOKING. The process of drying, curing, disinfecting and preserving freshly rolled coagulated latex in the fumes of burning wood, coconut shells, etc. The characteristic ham-like odor of rubber thus treated is due to the absorption of a small amount of creosote.

[1]Continued from THE INDIA RUBBER WORLD, April 1, 1921, pages 481-482.

SPECKY SCRAP. A Batavia term for a low grade crêpe. See Crêpe.

SPECKY BROWN CRÊPE. A New York term for a low grade crêpe. See Crêpe.

SPOTTED RUBBER. Rubber stained, blemished or discolored.

STANDARD QUALITY LATEX CRÊPE. New York term for first grade crêpe. See Crêpe.

STANDARD QUALITY RIBBED SMOKED SHEET. A New York term for best grade of smoked sheet. See Sheet.

STANDARD QUALITY SMOOTH SMOKED SHEET. A New York term for best grade of smoked sheet. See Sheet.

STANDARD QUALITY UNSMOKED SHEET. A New York term for a low grade unsmoked sheet. See Sheet.

STANDARDIZED RAW RUBBERS. Referring to a plan formulated for the British Rubber Growers' Association for a more accurate standardization and valuation of plantation crude rubber. Assuming 1,000 to represent the highest quality, as determined by tests as to tensile properties, physical condition and stability, all proving above the index figure of 900 would be rated as first grade; above 800 as second grade; above 700 as third grade; above 600 as fourth grade, and above 500 as fifth grade.

SCRAP. Remnants of rubber obtained after tapping, which are rolled into balls, made up into cakes or into lower grades of crêpe. Also a Java term for barky rubber. See Crêpe.

SCRAPINGS. Java term for scrap. See Crêpe.

TACKY RUBBER. Rubber more than normally sticky or adhesive, the cause being ascribed to decomposition of certain proteins by acid normally in the latex.

THICK PALE GRISLY CRÊPE. See Crêpe.

THIN PALE CRÊPE. See Crêpe.

TRINIDAD PLANTATION. Product of the cultivated Hevea or Castilloa from Trinidad and Tobago. See Plantation Pará.

UNSMOKED SHEET STANDARD QUALITY. New York term of a high grade. See Sheet.

UNSMOKED. Rubber that has not been treated by any smoking process.

UNSORTED SCRAPS. Java term for bark. See Crêpe.

UGANDA PLANTATION. Pará rubber from British East Africa. See Plantation Pará.

VACUUM DRYING. Dehydration of newly-made sheets of rubber in a steam-heated vessel or compartment which has been exhausted of air and moisture with a vacuum pump. It greatly shortens drying time and helps in the making of the blocks. Very efficient when handled by experts, otherwise rubber may be overheated, its nerve injured and its pores opened to harmful action by the air.

WORM RUBBER. Sheets of freshly-made rubber cut into thin worm-like strips with shears or machinery rolls.

WEST INDIES PLANTATION. Product of the cultivated Hevea or Castilloa rubber from that district. See Plantation Pará.

WASHING. Passing coagulated latex or scrap and a steam of water between grooved steel rolls revolving at different speeds.

WASH-WATER RUBBER. The rinsings of cups, pails and other receptacles which contain a certain amount of latex, which is coagulated and thus recovered.

The Glossary—Comments and Suggestions

THE FOLLOWING COMMENTS from those interested have been received:

GUAYULE—RUBBER OR SUBSTITUTE?

"Should not guayule be listed as a substitute and not as a true rubber?"

Guayule is a true rubber. Its source and characteristics, differing as they do from other rubbers, are responsible for its confusion with gums that contain no caoutchouc.

GUM ELASTIC

"Why should not the whole trade adopt 'gum elastic' as its term for rubber or india rubber?"

Excellent. But how can it be brought about?

ELIMINATING THE SHRINKAGE IN PARAS

"If all the Pará sorts were washed and dried, say at Pará and Manáos, would it not save freight charges and get rid of many meaningless names? Are there any objections to such a procedure?"

It would upset all existing brands, and buyers would be suspicious of new ones. Furthermore, mixtures of good and bad, of weak fine and fine would be likely to occur. Moreover, when some years ago, the plan was mooted it was found that the cost of washing at source was ten times as great as at the factory.

DEFINING RAW RUBBER COMPOUND

"In a patent suit the question of the meaning of the words, raw rubber compound, wants expert definition. Will you be good enough to wire me your definition of raw rubber compound? Our understanding being that raw or crude rubber is the base, together with the necessary curing agents, such as sulphur and whatever else might be added to give the desired results. But to be a raw rubber compound, nothing else but the two things, rubber and sulphur, have actually to be present. Namely, these two must be, but others may or may not be. If you speak of raw rubber compound you refer to a line of uncured compounds which are and have been well known to the rubber trade for a great many years, and such compounds are based on raw crude rubber combined with sulphur and such things as one may, from the experience of those skilled in the art, choose to combine."

Strictly speaking, anything mixed with raw rubber for any reason results in a raw rubber compound. If the product is to be vulcanized, sulphur or some vulcanizing agent is employed. If not, as in the case of electric tape or medicinal plasters, no sulphur or vulcanizing agent is incorporated.

WHAT IS CHICLE?

"I am curious to know if in your listings you will refer to chicle. Is it rubber, and if so, why is it taxed when other rubbers are free of duty?"

Chicle is derived from one of the Sapotads, trees that do not produce rubber, but from which nearly all of the gutta percha of commerce comes. It is really a Central American gutta percha. According to the last tariff law, crude india rubber and gutta percha are admitted free. Nevertheless, chicle, a gutta percha, is taxed.

SYNTHETIC RUBBER NOT RUBBER

"To my mind, synethetic rubber is not rubber. It is a substitute."

Nature runs one kind of laboratory, man another. When the products are the same, they would seem to merit the same name.

WHERE DOES BALATA BELONG?

"Certain of the authorities in describing balata claim that it is a gum that stands midway between rubber and gutta percha. Does that mean that it contains both gutta and rubber, and that it is actually neither a true rubber nor a true gutta?"

Balata contains no rubber. It does contain, however, some 39 per cent of true gutta. The statement that it ranks midway between rubber and gutta percha is misleading, as it refers to its elasticity in the crude state. East Indian gutta percha is hard like wood, balata is springy like whalebone, rubber is still more springy. Balata is just as truly a gutta as a lesser grade of rubber is a rubber.

Oils, Fats, Waxes, and Resins Used in the Rubber Industry[1]

By Frederic Dannerth, Ph.D.

INTRODUCTION

THERE ARE a number of materials used in preparing plastic masses which have two or more important and technically valuable properties. In a discussion of these materials we shall find that the properties or characteristics change gradually. For example, if we examine products obtained from mineral sources—cylinder oil, petrolatum, paraffine wax, ozokerite, ceresin, and montan wax, we find that these are entirely unsaponifiable.[2]

Turning to the so-called higher fatty acids, we find oleic acid to be a liquid resembling an oil, while stearic acid is a hard wax-like body, melting at 69 degrees C. (157 degrees F.). A chemical combination of these fatty acids with glycerol (glycerin) is found in the plant oils, generally obtained by pressing the seeds in hydraulic presses. Peanut oil is a non-drying oil; soya, a semi-drying oil; and tung, a drying oil. By this is meant that tung, like linseed oil, has the power or ability to absorb oxygen from the air and form a new substance which is dry to the touch.

Although the oils are liquid at usual room temperature (60 degrees F.), they are quite similar in chemical character to palm fat, coconut fat, and Japan fat (Japan wax). In the case of cottonseed stearin we have a substance which is obtained from cottonseed oil merely by refrigerating the oil. It is, strictly speaking, a fat.

In the next group we find substances in which the higher fatty acids are combined chemically with mon-atomic or di-atomic alcohols. They are never combined with the tri-atomic alcohol (glycerol). The waxes include the products obtained from the carnauba and candelilla, plants; beeswax, and wool wax (wool grease or lanolin).

All the plant and animal products mentioned thus far are saponifiable. That is they can be converted into soaps by boiling with alcoholic potash. This holds good for all but the nast named, the wool grease. Here we have a product which contains cholesterol and iso-cholesterol—both of them alcohols—chemically combined with acetic acid. Its saponification value is 100 compared with 190 for peanut oil.

Next we come to a group of substances designated "resins" because they are obtained as exudations from plants, and from the milk bearing canals of trees. Jelutong resin is a good example. It has a melting point of 160 degrees C. (320 degrees F.), and is therefore very brittle at room temperature, whereas wool wax is of the consistency of a fat. Jelutong resin and wool wax both contain esters of the cholesterol alcohols. Pine resin (colophony or common rosin) melts at about 130 degrees C., while guayule resin is a sticky mass resembling molasses, at room temperature (60 degrees F.).

PHYSICAL PROPERTIES

In studying the properties of these materials, with reference to their use in industrial work, we will find at once that the primary consideration is their melting point. The rubber chemist and the worker in plastic masses wants to know the temperature at which these substances soften and assume the condition of a liquid. As few if any of them are absolutely pure chemical compounds we will find that their melting point or their solidifying point varies slightly just as their other physical and chemical properties vary.

If they were absolutely pure chemical compounds they would, if they melted at all, have the property of melting at an almost constant temperature. In view of the fact that commercial commodities are prepared in a variety of ways and with varying degrees of carefulness, these *commercial* products differ slightly from the *chemically pure* article. Owing to the differences in reported specific gravities by different investigators it has been thought best in preparing data for the attached tables to take an average of several published specific gravity figures.

The points which are of interest to the worker in plastic masses are: (1) the specific gravity; (2) saponification value; (3) melting point; (4) viscosity; (5) the tendency which the material has to absorb or take up oxygen and change its character; (6) the chemical composition of the material.

In studying the solvents and thinners we are generally careful to consider the boiling point, because these materials are generally valuable as they are volatile; but in the case of oils, fats, waxes, and resins we want materials which lose little or none of their weight at 300 degrees F. (149 degrees C.). This will be readily understood when we consider that the latter group of materials are added to the rubber batch or dough in order to give it certain characteristics *permanently*. As rubber compounds are vulcanized at temperatures from 280 to 300 degrees F, they should contain no substances which will vaporize below those temperatures.

RESUME

Groups

1. Higher fatty acids.
2. Glycerides of the fatty acids. Non-drying and semi-drying.
3. Glycerides of linolic and linolenic acids. Drying.
4. Plant fats. Non-drying glycerides.
5. Esters of monatomic and diatomic alcohols.
6. Resins. Saponifiable and unsaponifiable.
7. Resinous gums.
8. Rubber gums. True rubbers.
9. Mineral oils, fats and waxes. Unsaponifiable.
10. Pitches, solid hydrocarbons, and distillation residues.

Part I—Raw Materials

GROUP 1

OLEIC ACID is a fluid of oily consistency which solidifies at about 14 degrees C. Combined with glycerol as glyceryl oleate it is the principal constituent of olive oil (olea europea).

PALMITIC ACID with a melting point of 62 to 63 degrees C. is present as glyceryl palmitate in palm fat, forming 98 percent of that fat. Japan fat is a mixture of about 10 per cent palmitic acid with almost 90 per cent of palmitin (glyceryl palmitate).

STEARIC ACID is a type of solid acid resembling a wax in appearance with a melting point of about 69 to 70 degrees C. It is found as gylceryl stearate in the fat of mutton, swine and beef.

Virtually all the oils and fats obtained from plants and animals are mixtures of glycerides of oleic, palmitic and stearic acids. For that reason it is possible to split them into their two constituent parts, fatty acid and glycerol or glycerine as it is known in commerce.

LAURIC ACID as glyceryl laurate is the principal constituent of coconut fat, and has a melting point of 43 to 47 degrees C.

GROUP 2

THE PLANT OILS known as peanut and olive are distinctly non-drying. In the next section we have soya, corn, cotton and rape, all of them seed oils classed as semi-drying. Here, too, belong

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[2] The saponification number, or Koettsdorfer value, indicates the number of milligrams of potassium hydroxide required for the complete saponification of one gram of the substance. Two grams of the oil, fat or wax are heated with 25 cubic centimeters of ½ normal alcoholic potash, in a suitable flask so as to prevent the evaporation of the alcohol.

the animal oils, the oil of menhaden fish, and the oil of hogs known in commerce as lard oil.

GROUP 3

THE DRYING OILS have been recognized for many years as important constituents of paints, varnishes and plastic masses. They are also used in the manufacture of oilcloth, linoleum and sulphurized oil products. This group includes linseed oil produced in the United States; the tung oil or China nut oil of China and Japan, the perilla oil of East India and China.

SULPHURIZED OILS (black rubber substitute, black oil substitute) can be made by heating the oil of peanut, soya, corn, cotton, rape, linseed or menhaden with flowers of sulphur until chemical combination has taken place. These products will always be found to contain a high percentage of free sulphur and free oil.

CHLORINATED OILS (white rubber substitute) are prepared by the action of the liquid sulphur chloride on these oils. If desired the oil may first be thinned down with an equal volume of some suitable volatile solvent, and the sulphur chloride may then be added to this mixture. A third method consists in spraying the oil into a chamber containing vapors of sulphur chloride.

GROUP 4

COTTON-SEED STEARIN is practically the only plant fat occuring in the United States. This is the solid matter which settles out when cotton seed oil is chilled.

PALM FAT is obtained from Africa and the Philippines.

COCONUT FAT is obtained from China, Ceylon, Brazil and Florida.

JAPAN FAT, known in commerce as Japan wax, is obtained from the berries or fruits of sumac trees in Japan and China.

GROUP 5

THE PLANT WAXES include carnauba obtained from Brazil and other South American countries as well as candelilla wax obtained from Mexico and southern Texas.

WOOL WAX, known in commerce as wool grease, is obtained from high-grade wool by extraction with a volatile solvent, or by scouring, while beeswax is the familiar product of the honey bee.

GROUP 6

THE RESINS available in large quantities vary in character from the bitter-tasting colophony, which can be converted into water-soluble sodium resinate, to the brittle resin of Pontianak or jelutong which is practically unsaponifiable.

JELUTONG RESIN. The resin extracted from Pontianak (*Dyera costulata*) by means of a mixture of acetone-gasoline possesses characteristics of such commercial importance that they are worthy of detailed notice. Washed and dried Pontianak yields on an average 75 per cent of resin, the balance being a rubber. The melting point of the resin is about 160 degrees C. (320 degrees F.). Its molecular weight is between 372 and 392. Some have considered the major constituent of jelutong resin to be an alcohol of the cholesterol series, while others have found in the resin certain bodies related to the sterols, namely, the acetates of lupeol, of alpha-amyrin, and beta-amyrin. Iso-cholesterol (dextro rotary) has also been recognized as present. It will be recalled that an ester of this alcohol is contained in wool grease. Jelutong resin so far as known is entirely unsaponifiable. This fact combined with its high melting point has been the principal cause for the use of Pontianak as an ingredient in "friction" compounds.

GUAYULE RESIN. This material is quite unlike the resins obtained from other varieties of rubber. It is very sticky, almost like molasses at a temperature of 60 degrees F. So far as known it contains no stearol-like constituents. The washed and dried guayule obtained from the *Parthenium argentatum* of Mexico contains about 25 per cent resins. They are, like the resins of Pontianak, soluble in commercial acetone as well as in a mixture of 53 gallons acetone and 47 gallons (of 70-degree) gasoline.

PINE RESIN. This is the solid residue found in the stills after the volatile oil has been driven off in the purification of crude turpentine. It is brittle, has a slightly bitter taste, with a smooth, glassy fracture. Colophony forms about 66 per cent of the crude turpentine. It is obtained from the long-leaf pine (*Pinus palustris*) found in the Carolinas. When boiled with caustic soda it takes up water to form a sodium salt of abietic acid. One hundred pounds of resin can be saponified by boiling with 15 pounds of soda ash. The melting point of pine resin is 130 degrees C. or 266 degrees F.

GROUP 7

THE RESINOUS GUMS include: natural guayule obtained from *Parthenium argentatum*, containing about 20 to 25 per cent resins; balata obtained from *Mimusops globosa*, containing from 40 to 50 per cent resins; gutta percha obtained from *Palaquium gutta*, containing about 50 per cent resins; chicle obtained from *Achras sapota*, containing about 60 per cent resins; jelutong obtained from *Dyera costulata*, containing about 75 per cent resins.

GROUP 8

Rubber gums, strictly speaking, would include all those rubbers of commerce containing not more than 5 per cent of resins based on the washed and dried weight. Fine Pará rubber, medium Pará rubber, coarse Pará rubber; plantation Hevea rubber, both smoked sheets and crêpe—all come easily within this group. Ficus, Funtumia and Landolphia rubbers with a resin content varying from 6 to 20 per cent would more properly be classed with the resinous gums.[3]

Part II—Plastic Masses

It is an interesting fact and one not generally recognized, that there are a number of industries which have many problems in common, therefore chemists and engineers would do well to examine into the processes, raw materials and products used in industries outside of their own.

The point is well illustrated in the case of concerns manufacturing rubber products, linoleum, oil-cloth, paints and varnishes. These industries are grouped together because they are based on the use of plastic masses. Generally speaking, they utilize oils, fats, waxes, pitches, resins and rubbers on the one hand and powdered minerals on the other. To be more definite the powdered minerals include: chemical elements, oxides, carbonates, sulphides, sulphates, and silicates. Here we have an enumeration of most of the possible ingredients of a rubber compound, but the list tells little if anything about the function of each ingredient in the mixture.

PAINTS, VARNISHES AND RUBBER GOODS

In recent years, the researches of chemists have brought to light a group of drying agents which to a great extent have displaced the older baking Japan driers. These are the metallic soaps; the linoleates of lead and manganese; the resinates of manganese, lead, cobalt and nickel. These substances are, in effect, catalytic agents which induce the rapid oxidation of the oil or varnish. They form two classes of compounds, one containing more oxygen than the other. And they easily pass from one form into the other. If, for example, we have a varnish containing oleo-resins, a small amount of lead resinate and some oil, we will find that the lead resinate gives up half of its oxygen to the oil, and then takes up more oxygen from the air. In this way, the lead resinate drier acts continuously as a go-between to

[3] Doctor Dannerth's conclusions are very interesting and, as a rule, sound. Just why, however, an arbitrary ruling should be made to the effect that a gum containing less than 6 per cent of resin should be a rubber, and one containing more should come under another classification, does not appear evident. A valuable constitutent of any rubber gum, be it Pará rubber or Pontianak, is the rubber it contains. As a rule, the resin is so much waste material. It is probable, therefore, that they will all continue to be rubbers. We take issue with him also, where he speaks of jelutong, "the balance being gutta rubber." Actually, the balance is rubber, and only rubber, as has been long established. In the writer's opinion, both guayule and jelutong, being rubber, should be classed with rubbers. Balata and chicle, being guttas, should be classed with the guttas.—THE EDITOR.

pass oxygen along from the air to the oil. The result is that the oil finally becomes permanently hard and the surface of the wood is protected. For 100 kilograms of oil, the manufacturer of varnish would use not more than one kilogram of the drier. This is equal to one per cent. In fact 1/10 of one per cent in many cases is quite sufficient to induce drying.

The accelerators used in the rubber industry, are generally recognized as catalytic agents, used for the purpose of carrying sulphur to the rubber, and helping these two substances to combine chemically. Charles Goodyear in his early experiments discovered that raw rubber could be converted into a useful substance by mixing it with a certain amount of sulphur, and heating this mixture while it was under compression.

Later it was found that the addition of litharge hastened the process of vulcanization, and so this substance was recorded as an accelerator, or as now termed a catalyst or "carrier." In this particular instance the litharge is a carrier of sulphur, but there are other substances which, being similar to litharge in chemical behavior, act in the same manner. These are the oxide of calcium (lime) and the oxide of magnesium (magnesia).

TECHNICAL PROPERTIES OF METALLIC SOAPS

If rubber has been properly vulcanized its physical properties of tensile strength and elasticity increase to a marked degree. If a varnish has been properly dried, we will note a similar change. This, and many other observations make clear why the rubber industry has much in common with the other industries which use plastic masses. Thus we find that several mineral soaps; the oleates and stearates of lead, and magnesium and calcium, have been applied successfully to the rubber-sulphur compound for the purpose of hastening vulcanization. Besides those just named, aluminium oleate, stearate, and resinate, and zinc oleate, stearate and resinate deserve attention as possible compounding ingredients which will give to the rubber mixture some property hitherto unknown.

LEAD OLEATE

The properties of lead oleate which commend it to the consideration of chemists and compounders in the rubber industry may be summed up thus:

1. It is possible to use as much as five pounds of lead oleate for each 100 pounds of rubber used.

2. The oleate can be incorporated without having the batch become soft and sticky.

3. If more than five per cent is used, the batch will not become soft or sticky, or difficult to work on the rolls.

4. Five pounds of oleate appear to be equivalent in action as a catalyzer to three pounds of litharge.

5. The molecular weight of lead oleate is 487 equal to the formula:

$$\begin{matrix} C_{17}H_{33}COO \\ C_{17}H_{33}COO \end{matrix} > Pb$$

It contains 42.5 per cent of lead by weight, and has a specific gravity of 1.50.

6. Owing to its oleaginous nature, lead oleate is easily mixed with the rubber, and more uniformly distributed in a shorter time, than is the case with litharge. The amount of lead in litharge or lead oxide is 93.0 per cent.

7. Lead oleate is preferable to aniline as an accelerator in those cases where poisonous vapors are objected to.

8. Oleate assists cohesion of the ingredients and helps the compound to stick together.

9. Oleate prevents blooming of the sulphur in the finished rubber product.

10. Oleate costs $29 per cubic foot, weighing 93.6 pounds.

11. When litharge is used, there is danger of burning the compound on the mill or calender, but if oleate is used this danger disappears.

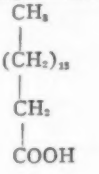
12. Lead oleate can be used with impunity in the same compound with bone glue.

CHEMICAL FORMULAS

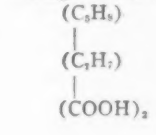
OLEIC ACID is a derivative of the olefine hydrocarbons and is a liquid at ordinary room temperatures, whereas stearic acid is a derivative of the methane hydrocarbons, and is a solid waxy substance at ordinary temperatures. The molecular weights are given below:

Oleic acid
Molecular
Weight = 282

Stearic acid
Molecular
Weight = 284



Resinic acid
Molecular
Weight = 656 ?



MAGNESIUM OLEATE is the product obtained by heating magnesia with oleic acid and is a plastic mass much softer than lead oleate. It can be used in compounds both for its lubricating properties as well as its ability to accelerate the cure.

PHYSICAL PROPERTIES OF SOME OILS, FATS, WAXES AND RESINS

Materials	Specific Gravity at 15° C.	Saponification Value	Melting Point Degrees C.
Oleic acid	.898	...	14
Palmitic acid	.853	...	62
Stearic acid	.839	...	69
Peanut oil	.920	191	Less than 20° C.
Soya oil	.925	193	
Corn oil	.921	190	
Rape oil	.913	175	
Cotton oil	.922	194	
Tung oil	.936	193	
Linseed oil	.932	194	
Perilla oil	.930	190	
Menhaden oil	.930	191	
Hog lard oil	.916	193	Under 20
Palm fat	.925	190—205	30—42
Japan fat	.970	220—240	50—55
Coconut fat	.911	245—260	20—25
Cottonseed stearin	.920	195	40
Candelila wax	.983	65	67
Carnauba wax	.995	80—85	84
Beeswax	.960	90—96	60—65
Wool wax	.973	98—102	40—42
Guayule resin	...	.....	<20
Pine resin	1.080	.....	130
Jelutong resin	....	.....	160

RULE TO DETERMINE THE VOLUME COST OF MATERIALS

One cubic foot of water at 16.5 degrees C. weighs 62.355 pounds. The specific gravity of water is 1.000. A substance having a specific gravity of 0.963 will weigh: 62.355 × 0.963 = 60.05 pounds per cubic foot. If this material is quoted at 12 cents per pound, it will cost: 12 × 60.05 = $7.20 per cubic foot. Therefore: 62.355 × specific gravity × price in cents per pound is equal to the price of the material per cubic foot.

The formula for magnesium oleate is C—36, H—66, O—4, Mg. as it takes two molecules of oleic acid (282) to combine with one molecule of magnesium oxide (40). Therefore 564 pounds of oleic acid combined with 40 pounds of magnesium oxide will yield 588 pounds of magnesium oleate under ideal conditions. Or it might be said that 14.7 pounds of magnesium oleate has as much magnesium in it as that contained in one pound magnesium oxide.

ALUMINUM OLEATE has a consistency resembling stiff jelly. It has been used for thickening mineral oils, because it swells to a considerable extent under their influence. Aluminum stearate and, in fact, all of the stearates are solid, resembling hard waxes. Zinc stearate is extensively used as an antiseptic dusting powder in medical work.

SPECIAL PATENTS

E. S. Ali Cohen has obtained a patent in Norway, No. 29446, February 10, 1919, for the production of a plastic mass of the following type: a metal compound of a fatty acid (a water-insoluble soap) is dissolved in a hydrocarbon of high boiling point. It is then treated with an oxidizing agent in a drying oil, heated to 200 to 250 degrees C.

A patent taken out by the same inventor in Holland, No. 3293, June 2, 1919, covers the use of the stearates of aluminum, manganese, chromium or iron dissolved in a fluid hydrocarbon. These compounds are suited as ingredients in linoleum compounds.

WOMEN RUBBER WORKERS

A fair idea of the extent to which women entered the rubber industry in America during the war period is given in a general survey embodied in Bulletin No. 12, recently issued by the Women's Bureau of the United States Department of Labor. It is shown that out of the 23,987 workers reporting in 80 rubber plants, after the first draft, 6,633 were women, or 276 in each 1,000 employed. After the second draft the proportion rose to 354 per 1,000. With the signing of the armistice and the closing of the gas-mask factories included in the rubber group, the proportion of women employed fell to 116 per 1,000. Statistics are far from being complete, but seven tire factories reported about 4,294 women as having taken the places of men since 1917. They have been employed to cut tire fabric with machines, others to prepare fabric for men tire builders, while some make inner tubes, stamp sizes and names on the tubes, and box them for shipment. Tire beads and treads are trimmed and wrapped by women, and small tires finished and inspected by women, "because of their deftness, quickness, and neatness," as one concern puts it.

In one large plant some women have replaced men in rubber washing and in reclaiming, some have helped at the calenders, others have cemented rubber boot parts, and some have taken well to the work of molding rubber heels, while others have replaced men in cutting and cementing balloon fabric. But, generally speaking, relatively few women are still in the rubber trades.

"WHAT IS VULCANIZATION?" A BRIEF, NON-TECHNICAL TREATISE for the general reader, distributed by the United States Rubber Co., 1790 Broadway, New York.

The origin, development, and the universal importance of vulcanizing are briefly and interestingly related; and a very good résumé is given of the art of tire manufacturing. So exact is this art that a "second" occurs but once in a thousand tires. Users are reminded that a properly-cured tire cannot be subjected to further curing without producing an "overcure," which results in early destruction of the rubber. Hence are tire-owners cautioned against careless retreading in which part of the carcass is often overcured while the new tread is being vulcanized, and the tire's life shortened, instead of being lengthened.

GUIDE FOR MAKING SPLICES

Tire Surgeon offers the following to those who realize the money to be made by making one good tube out of two old ones or in cutting sections from one tube and splicing blowouts that are past repairing by the usual patch method.

For example: In making a 30 by 3½ tube from old tubes of 3½-inch size, measure the longest portion and take from another tube the difference, 85 inches, and allow 2 inches for the splice which, when spliced, will give you the length before last splice is made. The 85 inches allow for a 2-inch splice, as shown in the column under "Splice Length."

Size	Pole Length Inches	Hole for Valve Inches	Splice Length Inches
26x3	74¼	¼	2
30x3	86½	¼	2
30x3½	85	¼	2
32x3½	91½	¼	2
31x4	86½	¼	2½
32x4	89½	¼	2½
33x4	91½	¼	2½
34x4	96	¼	3
32x4½	89½	¼	3
33x4½	93	¼	3
34x4½	96	¼	3
35x4½	99	¼	3
36x4½	102½	¼	3
33x5	90	¼	3
35x5	97	¼	3
36x5	100½	¼	3
37x5	104	¼	3

JUNIOR RUBBER TECHNOLOGIST

The United States Civil Service Commission announces an open competitive examination for junior technologist. Vacancies in the Bureau of Standards, Department of Commerce, for duty in Washington, D. C., or elsewhere, at $1,200 to $1,500 a year, and vacancies in positions requiring similar qualifications, at these or higher or lower salaries, will be filled from this examination, unless filled by reinstatement, transfer, or promotion.

Competitors will be rated in the following optional subjects, and applicants should state in which of these subjects they desire to qualify: Rubber technology; leather technology; paper technology; textile technology; oil technology; general technology.

Applicants should at once apply for Form 1312, stating the title of the examination desired, to the Civil Service Commission, Washington, D. C.; the secretary of the United States Civil Service Board, Customhouse, Boston, Massachusetts; New York, New York; New Orleans, Louisiana; Honolulu, Hawaii; Post Office, Philadelphia, Pennsylvania; Atlanta, Georgia; Cincinnati, Ohio; Chicago, Illinois; St. Paul, Minnesota; Seattle, Washington; San Francisco, California; Old Customhouse, St. Louis, Missouri; Administration Building, Balboa Heights, Canal Zone; or to the chairman of the Porto Rican Civil Service Commission, San Juan, Porto Rico.

Applications should be properly executed, excluding the medical certificate, and must be filed with the Civil Service Commission, Washington, D. C., prior to the hour of closing business on May 10, 1921.

HEVEA PLANTATIONS IN THE CONGO

ACCORDING TO A REPORT BY THE SOCIÉTÉ ANONYME BUNGÉ, THE following quantities of rubber arrived at Antwerp:

During 1919—first quarter, nothing; second quarter, nothing; third quarter, 5,719 kilos; fourth quarter, 1,829 kilos; total, 7,548 kilos.

During 1920—first quarter, 7,711 kilos; second quarter, 19,361 kilos; third quarter, 17,559 kilos; fourth quarter, 12,553 kilos; total, 57,184 kilos.

These quantities come almost exclusively from the plantations of the Belgica at the island Bertha, from the Forminière at Lake Leopold II, and from the government plantation at Yangambi.

Repairing Rubber Footwear—III[1]

A New and Growing Industry

Dissecting Old Boots and Shoes—Boot Making—Parts of a Light Rubber Shoe—The Dry-Heat Cure—The Pressure Cure—The Footwear Repair Unit—Cold Cure Patching

DISSECTING OLD BOOTS AND SHOES

A MAN who expects to be an expert pneumatic tire repairer must know how tires are built. Those who have not had an opportunity to visit the great tire factories, as a rule, have dissected old tires, tearing off the tread, separating the plies, cutting open the bead, and, in fact, learning exactly, through this destruction, how the tire was put together.

To be a successful footwear repair man, if one cannot spend time in a rubber footwear factory, the same procedure is of great advantage. For example: If one will take an old rubber boot and cut a wedge-shaped piece out of the sole and upper, the different portions that go to make up those parts will be exposed in cross-section, and the view will be very informing. Further investigation includes tearing off the outer sole, the inner sole, stay pieces, and the various fillers, and examining them in detail as to what they are made of, their stretch, resilience, and hardness—of course, in a "rule of thumb" way. The necessity for this is, that in repairing a boot, the original structural conditions should be as nearly as possible reproduced in order to make the repair successful. The same method of dissection should be resorted to with heavy overshoes, arctics, light shoes, and any other styles

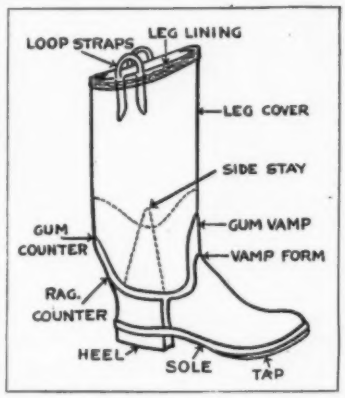
DISSECTED RUBBER BOOT

one essays repairing. In fact, no knowledge of the making of rubber footwear that any repair man can get will be out of place.

BOOT MAKING

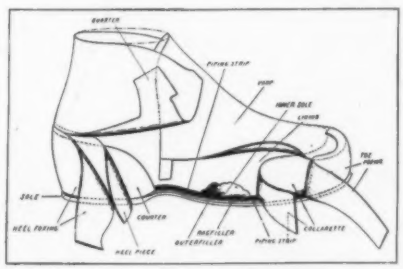
The repair man, before he has been in business long, will be introduced to quite a variety of boots. In accordance with trade nomenclature, the types are known as short, knee, Storm-King, thigh, and hip boots. Incidentally, he will run across firemen's boots, lumbermen's overs, oystermen's boots, acid boots, and other specialties in the boot line. Most of these boots have black soles, but some have red soles, and others white. In repairing a red sole, red repair stock will be necessary, but that is very easily secured, as is also white stock for white boots or white soles.

So many inquiries have come for information as to how boots are made that a brief description of the old-time process is in order. To begin with, all rubber boots are made upon "trees," either maple or aluminum. The boot maker receives the cloth and rubber parts with which he is to build the boots, in cloth books. These parts he cements and dries in the order in which they are used. The first step in making is lasting. The boot tree is set on a block with the foot upwards, and the leg and vamp linings cut to fit are wrapped snugly around the tree and joined along the back of the leg by a strip of thin rubberized fabric known as "piping." Piping is frictioned sheeting; that is, the structure of the fabric is filled and coated with sticky rubber and is used for binding the various parts of the boot. The leg lining is seamed up the back of the tree by running a strip of piping from heel to top. The edges of the lining around the foot are then lapped over the edge of a rubber and fiber inner sole and stuck fast upon it. This makes a little ridge around the sole and the space inside of the ridge is leveled up to the ridges or filled with what is known as the "rag filler," really a tough fiber and rubber combination. Outside of this is placed a very tough sole made of rubber and fiber, which is called the "rag sole." This is skived around the edge so that it will be smooth and then the rag sole and lining are brushed over with a fine quality of cement and allowed to dry. When fully dry, holes are cut for straps in the upper part of the legs, and they are placed in position. Then heel stays are added, which are triangular pieces of rubber and fabric; next comes a heavy counter of rubber and fiber. This is followed by a back strip running all the way from the heel to the top of the boot. Then follows the toe strip, the piping around the edge of the sole, and the ankle side stays, when the boot is finished except for the outside rubber covering.



STANDARD SHORT BOOT

The leg cover, of rubber without any attached fabric, is then placed carefully over the whole, with the exception of the sole and part of the toe. This must be put on smoothly with a binding around the top, and is followed by the vamp lining, the sides of which extend over the counter. The outer filler is next added to the bottom of the foot. The operation known as covering is next in order. A counter of heavy rubber is put around the heel, then a vamp of heavy rubber, the tongue exactly covering the heavy lining. The sides of the vamp extend to the counter and half around the side seams. When placed, the vamp is cut around the toe filler to the bottom of the boot, coated with cement, ready for the sole.



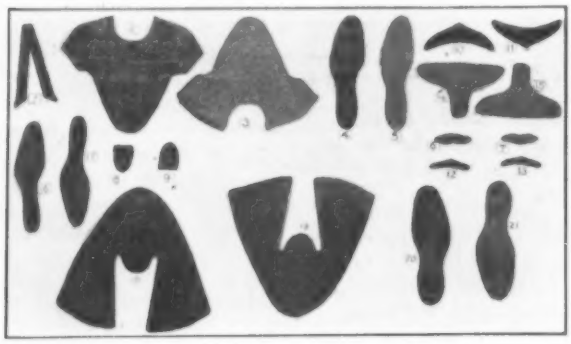
STANDARD ARCTIC OVERSHOE

The soles are built separately and consist of a fiber and rubber form, and then the rubber piece, top and heel. These come to the boot maker ready for application and are applied as the

[1]Copyrighted by Henry C. Pearson, continued from THE INDIA RUBBER WORLD, April 1, 1921, pages 477–480.

last process in bootmaking. Incidentally, it should be remarked that in every part of the work, either a hand roller or stitcher is used to cause the parts to adhere and also to exclude air from being imprisoned between the cemented surfaces.

Going back to the parts of a boot and to the dissecting that the boot repairer will indulge in, it will be best for him to discover all the various parts for himself, because any written description probably will not be retained in his memory. If, therefore, he will hunt for the piping, leg lining, toe lining, inner sole, toe



PARTS OF A WOMAN'S LIGHT RUBBER SHOE

filler, skived sole, vamp form, side and back stays, ankle piece, vamp cover, counter and vamp, he will soon be able, not only to understand exactly how the boot is built, but also to rebuild it when the necessity arises.

Just as the boot is built up of separate parts, cemented together and vulcanized as a whole, so are shoes. For example: An arctic or a lumberman's "over" will show by analysis counter, vamp, piping strips, inner sole, inner and outer sole fillers, outer sole, toe and heel foxing, etc. The parts run anywhere from 18 to 30, and they are all necessary, and until one is familiar with them all, it is difficult to get the best out of the business of footwear repairing.

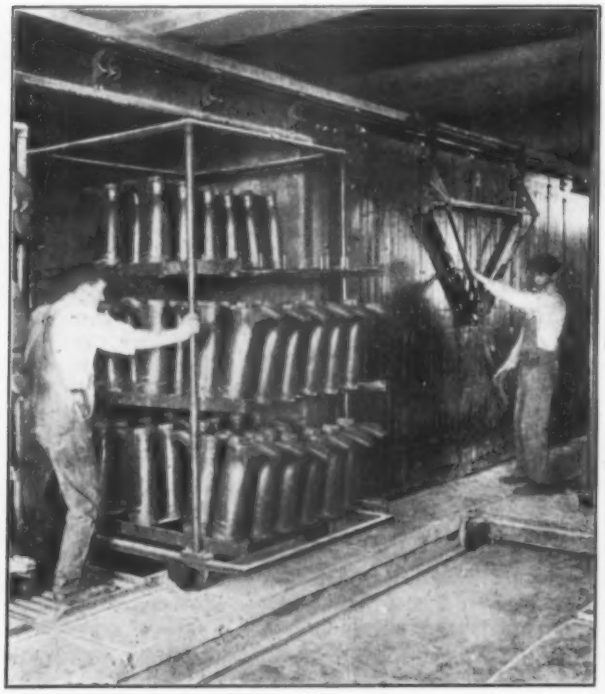
PARTS OF A LIGHT RUBBER SHOE

The numerous parts essential in the making up of an ordinary light rubber for women's use are shown in the illustration in which the separate pieces are numbered and described as follows:

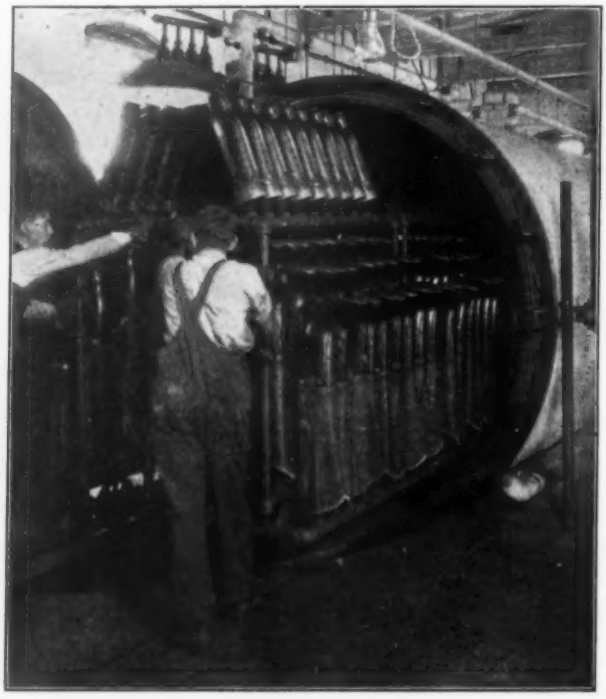
1. Piping strip of frictioned sheeting, for joining the upper to the inner sole around the edge of the latter. 2. Shoe lining showing the rubberized surface to receive the outside rubber vamp (18 or 19). 3. Plain or cloth side of the shoe lining. The dark outline indicates the piping strip for joining the heel seam and uniting with the inner sole. 4. – 5. Rubberized and plain sides, respectively, of the inner sole. 6. – 7. Frictioned fabric stays for reinforcing the toe. 8. – 9. Rubber and fiber, "rag," heel fillers. 10. – 11. Outside rubber heel reinforcement pieces. 12. – 13. Frictioned fabric stays for rear of the heel. 14. – 15. Frictioned fabric heel counter. 16. – 17. Rubber and fabric, "rag," sole fillers. 18. – 19. Outside rubber vamp coverings.

THE DRY-HEAT CURE AND THE PRESSURE CURE

Those who repair rubber footwear will almost at once come in contact with two separate types of goods. The old-fashioned dry-heat cure has evolved a product all its own and one that is distinctive. The meaning of dry-heat cure is that a rubber boot or shoe, when it has been built up for vulcanization, is put in a room in which the air is heated to vulcanizing temperature, and left there several hours until vulcanization is effected. As air is a poor conductor of heat, this is a slow process of curing. To hasten it and indeed make it possible, the compound contains oxide of lead, otherwise known as litharge, and considerable of it. The litharge acts as an accelerator or a hastener of the cure, and is necessarily present in 98 per cent of the dry heat goods. It is rather necessary that the repair man should know when he is handling dry-heat goods, as litharge stock in a press, or in contact with hot metal, will cure quite quickly and there might be danger of burning. A very little experimenting, however, with scraps from an old boot leg on the vulcanizing plate will show the repair man exactly how far he can go in applying heat to work of this kind.



DRY-HEAT VULCANIZER

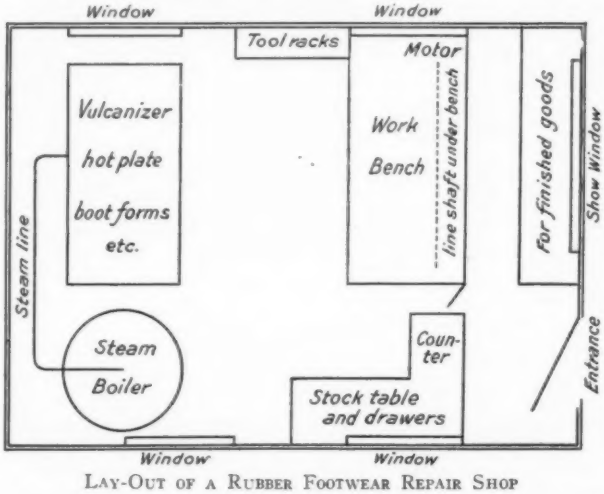


PRESSURE-CURE VULCANIZER

The pressure cure is the newest development in rubber footwear manufacture and is of great value, not only to the wearer, but also to the rubber footwear repair man. In this case, the goods are cured in an air-tight chamber under a very considerable pressure of gas. The air inside of the boot is also pumped out by vacuum, and thus the gas surrounding the outside acts not only as a mold compressing the parts tightly, but carries the heat into the rubber rapidly, and thus vulcanization is quickly performed. The goods made by the pressure cure are not necessarily compounded with litharge, as are those by the dry-heat cure. In fact, the stocks from which they are made are very similar to those from which tires are built. This is why tire repair material is so useful, particularly with pressure-cured goods. This does not mean that many of the repair materials cannot be used in dry-heat repairing.

THE FOOTWEAR REPAIR UNIT

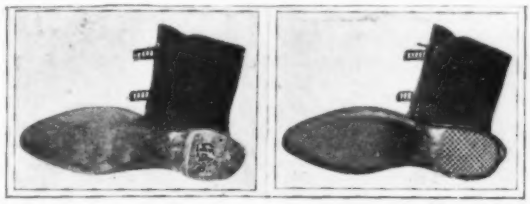
The state of the art of shoe repairing is such that the repair corner is quite likely to be dark, crowded and confused. In other words, the business of tire repairing is of so much more importance that it is given, not only the best position in the shop, but



LAY-OUT OF A RUBBER FOOTWEAR REPAIR SHOP

altogether the best organization. That is why the shoe-repair unit is apt to consist of one vulcanizer set up against a wall in a dark corner, a single shelf crowded with clippings, scraps, tools, empty cement jugs and a great variety of things, confusing rather than helpful. Of course, in time this will correct itself. There will be racks if repair stock is used in the roll, shelves or drawers if used on a small scale; covered bins for all types of unvulcanized scrap, each plainly labeled; the presses will be so placed that there is plenty of room to get around them, and the lighting will be perfect; work tables will be zinc covered, equipped with places for tools within easy reach; the tools will be stamped with the name of the department to keep the tire men from borrowing, and the whole so arranged that the work moves continuously without any sort of double handling. This, of course, would call for pigeon-holes or hangers for tagged goods that are to be repaired, and similar arrangements for goods that have been repaired. Incidentally, referring to bins, a very excellent thing is to have a covered tin can for cement scraps. Speaking of cement, unvulcanized scraps and cement scraps can be dissolved in naphtha and used for ordinary work. For mixing small amounts a small can, with a hand stirrer, is all that is necessary. It should be remembered, however, that cement should be stirred thoroughly before use, as the heavier compounding ingredients and the sulphur will often settle and be at the bottom, in which event the cement used from the top would not vulcanize.

No matter where the shoe repair department is placed, it should be very thoroughly ventilated. It will be found that the work goes on much more smoothly and much more work is turned out if this is the case. It should also be equipped with fire extinguishers, as should any room where either cement or naphtha is



GAITER—BEFORE AND AFTER REPAIRING

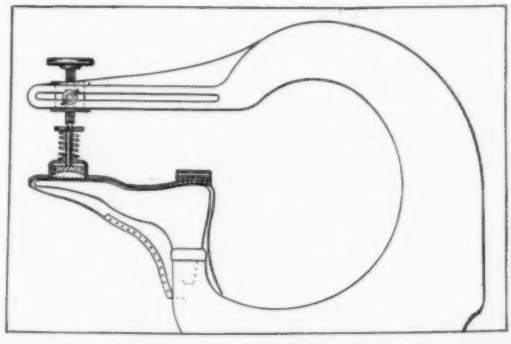
used. A very excellent precaution against the spread of fire, if one has plenty of steam, is a steam-pipe that will enable live steam to be turned upon flames as an extinguisher.

COLD CURE PATCHING

By means of suitable facilities for exerting pressure over the repaired area it is feasible to mend punctures, cuts, tears and chafed spots on ordinary rubber boots and shoes, or even to apply new soles by this method. In making a cold-cure repair, cured patching material should be used. The patching stock and spot to be repaired are prepared in the same way as for patching an inner tube, namely, by cleaning with naphtha the surfaces that are to be united, roughing them with sand paper and applying to each a couple of coats of heavy pure gum cement. When the cement is thoroughly dry the cemented surfaces are thoroughly wet with curing acid and promptly brought together under pressure over the entire area of the patch, and so held until the cure is complete, say for 15 minutes.

The illustration shows a convenient clamping arrangement designed for cold-cure shoe repairing, in which the shoe is held on a removable last and the patch is held firmly in contact during the cure under an iron pad held by the elastic force of a spring, upon which pressure is exerted by a screw and hand-wheel. The latter is adjustable to any position within the range permitted by the slotted way in the top arm of the holder.

This particular device was patented in 1906 by A. S. Bowley. The essential pressure to ensure a firmly attached cold-cure patch



THE BOWLEY COLD-CURE PRESS

may be secured in a variety of ways. The principle having been shown the resourceful repair man will easily find the means to meet the working conditions as they arise in practice.

HOW DO YOU WASH YOUR CAR? WATER THAT SEEPS DOWN BETWEEN rims and tires quickly rusts neglected rims and destroys tubes, flaps and even the beads or edges of the tire. Use stove polish, nickel paint or graphite to overcome this condition. This also prevents the tire from creeping by giving it a firmer hold on the rim.—*Miller News Service.*

U. S. LONG-STAPLE COTTON PRODUCTION[1]

THE urgent demand for long-staple cotton in the manufacture of thread, automobile tires and the higher grade fabrics has given such varieties an importance seemingly out of proportion to the amount produced. While at one time long-fiber sea-island cotton grown in the West Indies provided a large part of the total cotton used in Europe, the world's production of this variety at the present time is comparatively insignificant, being less than 20,000 bales. The quantity of long-fiber cotton produced in Egypt last year was about 1,100,000 bales, and the quantity of upland and American-Egyptian cotton with a staple of 1⅛ inches or more in length produced in the United States from the crop of 1919, according to the estimate of the Department of Agriculture, was 1,000,000 bales. Long-staple cotton is also produced in comparatively small quantities in India, Brazil, Peru, and several other countries. Altogether the total of long-staple cotton—that is, cotton having a fiber of 1⅛ inches or more in length—produced throughout the world from the crop of 1919 did not, in all probability, exceed 2,250,000 bales.

SEA-ISLAND COTTON

The sea-island cotton crop of 1919 amounted to only 6,916 running bales, or 2,510,000 pounds gross weight, equivalent to 5,020 bales of 500 pounds each. The reduction in the production of sea-island cotton, due to the ravages of the boll-weevil and to reduction in acreage on account of the pest, has been rapid and pronounced, the total for the crop of 1916 being 117,559 running bales. Recent ginning census indicates that last year's crop will be less than 2,000 bales.

AMERICAN-EGYPTIAN COTTON

The imports of Egyptian cotton into the United States during the year ended July 31, 1920, amounted to 485,004 bales of 500 pounds each. The demand for Egyptian cotton by American manufacturers has led to efforts to grow in the United States cotton having its characteristics, and its culture has been established in Arizona and California. The status of the cultivation of Egyptian varieties of cotton in this country is presented in the following statement, prepared by the Bureau of Plant Industry of the Department of Agriculture:

The crop of American-Egyptian cotton of the calendar year 1919 amounted to 42,374 bales of 500 pounds each and consisted exclusively of the Pima variety which has an average length of staple of 1⅝ to 1¾ inches. The great bulk of the crop was produced in Maricopa County, Arizona, but several hundred bales were produced in Pinal, Pima, and Yuma Counties, Arizona, and in Imperial, Kern, and Fresno Counties, California. The prices received were by far the highest in the history of the industry. Toward the close of the marketing season a sale at $1.35 a pound to the producer was recorded. The total value to the growers of the lint and seed produced is estimated at about $20,000,000. The value of the crop in Maricopa County is stated greatly to have exceeded the entire cost of construction of the Salt River reclamation project, including the Roosevelt Dam.

The acreage which has been planted to American-Egyptian cotton of the Pima variety in Arizona and California in 1920 is estimated provisionally at 256,000 acres, or more than two and one-half times the acreage grown in 1919. Of this total approximately 185,000 acres are located in Maricopa County, Arizona. Preliminary estimates of the acreages in other counties are:

Arizona	Acres	California	Acres
Yuma County	13,000	Imperial County	28,000
Pinal County	10,000	Kern County	10,000
Pima County	5,000	Other Counties	5,000

LONG-STAPLE UPLAND COTTON

Formerly a large part of the long-staple upland cotton produced in the United States was grown in the Mississippi Delta, where a market for handling cotton of this character had been created. With the increased demand for superior staple cotton, efforts were made in other sections of the cotton belt to grow improved varieties of upland cotton.

Complete data of the production of long-staple upland cotton are not available. The Bureau of Crop Estimates of the Department of Agriculture, however, made an inquiry to determine what percentage of the total crop of 1919 was long-staple. The results of this inquiry are given for the crops of 1918 and 1919 in the tabular statement below.

LENGTH OF COTTON LINT—RELATIVE PRODUCTION: CROPS OF 1918 AND 1919

Compiled from publications of the Bureau of Crop Estimates, Department of Agriculture

State	Over 1¼ Inches		1⅛ to 1¼ Inches		Under 1⅛ Inches	
	1919	1918	1919	1918	1919	1918
	Percentage of Total Crop					
United States.....	1.3	1.5	7.5	9.8	91.2	88.1
Alabama	....	.....	0.3	0.7	99.7	99.3
Arkansas	3.4	2.6	15.4	20.4	81.2	77.0
Arizona	6.0	.....	.....	3.6	40.0	35.7
California*	1.0	.....	10.0	13.4	90.0	83.6
Florida	18.8	7.1	.....	7.1	81.2	32.2
Georgia	0.2	1.3	1.1	3.5	98.7	94.4
Louisiana	0.3	0.3	2.4	3.8	97.3	95.9
Mississippi	4.4	5.4	31.2	38.4	64.4	56.2
Missouri	....	.....	5.6	6.5	94.4	93.5
North Carolina.....	0.4	0.1	1.4	0.9	98.5	99.0
Oklahoma	0.2	1.0	7.6	9.6	92.2	89.4
South Carolina	1.7	2.6	6.5	7.8	91.8	89.2
Tennessee	0.6	0.3	4.9	4.6	94.5	95.1
Texas	0.2	0.2	5.9	7.0	94.1	92.8
All other States.....	...	....	....	6.5	....	93.5
	Bales in Thousands (000 omitted)					
United States.....	152	177	854	1,182	10,372	10,588
Alabama	....	.....	2	6	710	794
Arkansas	30	26	136	201	717	758
Arizona	36	.....	.....	2	24	20
California*	1	.....	10	9	89	56
Florida	2	2	.....	2	14	9
Georgia	3	27	18	75	1,637	2,002
Louisiana	1	2	7	22	289	566
Mississippi	42	66	297	470	613	689
Missouri	....	.....	4	4	60	58
North Carolina.....	3	1	12	8	814	887
Oklahoma	2	6	75	55	907	515
South Carolina.....	24	41	92	122	1,306	1,397
Tennessee	2	1	15	15	292	313
Texas	6	5	181	189	2,878	2,499
All other States.....	....	.....	5	2	22	29

*Including some grown in Mexico.

The reports of the length of staple show a total of 1,006,000 bales of cotton having a length of 1⅛ inches or over, produced from the crop of 1919, against 1,359,000 bales of this length of the crop of 1918. The marked increase in long-staple production is due primarily to the relatively high prices paid for it during the last few years, and secondarily to improved varieties which, in sections suitable to their growth, are showing themselves to be almost or quite equal in yield and in early maturity to standard varieties of short staple. Responses to supplemental inquiries as to the proportion of the crop represented by specified lengths of staple indicated that 1.3 per cent of the total crop ran over 1¼ inches, the percentage in Mississippi being 4.4 per cent of the total crop. The most important states producing long-staple upland cotton in 1919 were, in the order of quantity produced, Mississippi, Texas, Arkansas, and South Carolina.

[1]From Cotton Production and Distribution—Season of 1919-1920. Bulletin 145, Department of Commerce.

LABOR TERMINOLOGY, BULLETIN No. 25, BUREAU OF BUSINESS Research, a publication of the Graduate School of Business Administration, Harvard University, Cambridge, Massachusetts, Vol. VII, No. 1, March, 1921, is a dictionary of labor terms used by organized labor. This bulletin is compiled after careful perusal of copies of constitutions, trade agreements and proceedings of conventions of all international and national unions.

Rubber Masks and Faces

A New and Interesting Development

A NEW USE of rubber which marks a revolutionary change in theatrical productions is the rubber face worn by various actors. With it, the wearer may simulate a thousand characters and reproduce even the most fleeting expressions of the original's countenance. Invented to meet an urgent need in the moving picture industry, the new art is apparently destined for service in a far wider field and in a more enduring manner.

HEAD, FACE AND NECK MASK

The rubber face was devised by Alexander Hall, a sculptor, who observed that even the most ingenious make-up fails to give an actor the true facial contour and lineaments of the character he assumes, and that great difficulty is experienced in preparing animated grotesque figures for the films. Mr. Hall hit upon the plan of making not merely false faces, but also heads and necks of one piece of rubber cuticle. One of the newer rubber companies in Southern California was intrusted with the practical working out of the problem.

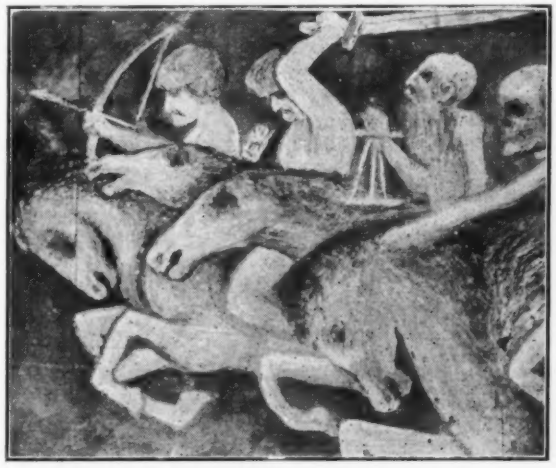
The mode of manufacture is as follows: A type of character having been modeled in clay, the bust is varnished and then dipped in a fine Pará rubber solution, the process resembling that used in the making of rubber gloves. The rubber covering of the clay bust is cured and rolled off the form. Then, filled with sawdust, it is touched up in colors, and a wig, beard, etc., added. Puffed cheeks are made by repeatedly dipping those parts, or by additional coats of rubber. Rolls of flesh about the neck are obtained with cotton padding, over which the rubber stretches, or, where much distension is desired, by making inflatable double sections.

When the eyes in the face are slitted, so fine is the cuticle that it fits upon the eyelids and allaws them to be opened and closed with almost natural freedom. The illusion is heightened by the rubber curving inside the lips and slightly into the nostrils, suitable apertures being left to allow the wearer to breathe and speak with ease. In fact, the rubber article, unlike the old type of false face, by reason of its mobile, pliable quality, adapts itself in an almost uncanny way to the muscles of the face and permits of almost endless expression. A "speaking likeness" may thus become a reality, and an effigy of anyone made by this process may, many a year hence, be as easily quickened as is a phonographic record of their voice, and have even greater historical value.

It is prophesied that uses other than those of the stage are likely. For instance, the celebrities of a century that pose only for the patrons of Madame Tussaud's Wax Works in London or the Musée Grévin in Paris, could be duplicated in rubber, tinted, etc., like the plastic originals and displayed everywhere with the advantage in favor of the rubber faces, which can be animated at will. Its possibilities in historical pageantry and theatrical productions are endless, while the educational value of it is self-evident.

It is conceivable that the new rubber art may even greatly enhance the usefulness of another new art—that of photo-sculpture, and cause to be placed in innumerable schools, museums, homes and public buildings, life-like replicas in rubber (instead of "dead" plaster casts) of the statues of living notables made by the ingenious process invented by Professor J. Hammond Smith of the University of Pittsburgh, and whereby any face, figure, or object may be swiftly molded in clay, and every feature portrayed with photographic exactness. Shadow lines in network are first cast by stereopticon upon the figure placed on a rotating stand; the figure is then photographed from various angles (as was done in six minutes with President Harding as the subject); the developed photographs are then projected on the mass of clay put in place of the figure on the revolvable stand, and the modeler thus guided, fashions his material with an ease and accuracy unknown to old-time sculptors.

Though few may have remarked them, yet multitudes have already seen the new rubber masks. Two of the "Four Horsemen



RUBBER MASKS IN "THE FOUR HORSEMEN"

of the Apocalypse," a recent motion picture production, employ the rubber face-covering in a strikingly realistic representation of Famine and Death riding in a cloud over the victims of Conquest and War.

IMPROVED BURRS FOR RUBBER HEELS

The reference to heel burrs on page 489 in the April issue of this journal is somewhat misleading, as the inference might be drawn that the burrs manufactured had eccentric holes and ragged edges. A leading manufacturer claims that its burrs are and always have been of good quality with central holes and good edges; they are flat, not dished, making them easy to handle.—J. H. Sessions & Son, Bristol, Connecticut.

REMOVING GIANT PNEUMATICS

By pushing the valve stem inside and taking a piece of steel thin enough to insert between the rim and the tire, so that it runs through to the permanent rim on the other side, the rim can be removed. Use a hammer and drive the steel around the rim from stem to stem to loosen the tire and it will fall off easily. Then grease the rim to remove all rust. —*Tire Surgeon.*

REACTIONS OF ACCELERATORS DURING VULCANIZATION[1]

II—A THEORY OF ACCELERATORS BASED ON THE FORMATION OF POLYSULPHIDES DURING VULCANIZATION

By Winfield Scott and C. W. Bedford[2]

THE INVESTIGATION of organic accelerators, as shown by the literature of the past five or six years, appears to be confined largely to a search for new compounds or a combination of compounds to catalyze the addition of sulphur to rubber. It has been shown that these accelerators are almost entirely organic nitrogen compounds, and as a result nearly all classes of nitrogen-containing substances have been tried. Furthermore, it has been shown that the nitrogen of such compounds is basic or becomes basic during vulcanization by the action of heat, sulphur, or hydrogen sulphide.

It has been previously proposed that a sulphur reaction of the accelerator is necessary, and certain reaction products in some way make sulphur available for vulcanization. In some cases a sulphur reaction is doubtless necessary to form the true accelerator, which is a polysulphide.

The latest theory for the action of accelerators during vulcanization is that of Kratz, Flower and Coolidge[3]. These writers attribute the accelerating action of amines, such as aniline, to the formation of an unstable addition product of aniline and sulphur, in which the sulphur is temporarily attached to the nitrogen, making it pentavalent.

The compound thus formed gives up its sulphur to the rubber and is then regenerated by a further reaction with sulphur.

The writer believes that the mechanism of the action of amines is represented differently from that given by the above investigators, and that hydrogen sulphide is one of the important factors in acceleration. It is believed that, in general, amines catalyze the addition of sulphur to rubber. As a specific example, dimethylamine, with hydrogen sulphide and sulphur, forms a derivative of ammonium polysulphide as follows:

$$(CH_3)_2NH + H_2S \longrightarrow (CH_3)_2NH_2SH$$
$$(CH_3)_2NH_2SH + xS \longrightarrow (CH_3)_2NH_2\underset{\underset{\displaystyle Sx}{\|}}{SH}$$

Polysulphide compounds similar to the above are considered to be the true accelerators that furnish the sulphur necessary for vulcanization. That this type of sulphur is available for vulcanization has been shown by Ignaz Block[4], who states that hydrogen polysulphides (H_2S_2 and H_2S_3) will cure rubber at ordinary temperatures. C. O. Weber[5] quotes Gerard and his work showing that alkali polysulphides in concentrated solution will also vulcanize rubber.

ORGANIC ACCELERATORS

All organic accelerators do not function in the same manner as the bases, and for this reason the writers choose to divide accelerators into two classes.

I. HYDROGEN SULPHIDE POLYSULPHIDE ACCELERATORS. In this class belong those bases which form polysulphides similar to yellow ammonium sulphide

II. CARBO-SULPHYDRYL POLYSULPHIDE ACCELERATORS. This includes all accelerators that contain the grouping = C-SH, such as the thioureas, dithiocarbamates, thiurams, mercaptans or the disulphides which may be formed from them by oxidation or by reaction with sulphur.[6]

To the first class belong all basic organic accelerators or such compounds as produce basic accelerators under curing conditions. Certain inorganic accelerators may also be included. These will be discussed later in the paper.

The second class includes certain of the Schiff bases[7] which form thiourea derivatives by a sulphur reaction during the cure. Further discussion of this class will be reserved for a later paper[8].

The phenylated guanidines belong to both classes, since at curing temperatures they easily react with hydrogen sulphide to form thioureas and free amines. Diphenylguanidine, for example, gives thiocarbanilide and ammonia.

The present paper deals with the first-mentioned class of accelerators, i. e., with those which, in the presence of hydrogen sulphide under curing conditions, form polysulphides analogous to those of sodium and ammonium.

The structural relationships of the polysulphides of the nitrogen bases and the more positive metals are not clearly understood at present, although it is known that some of the sulphur is held in a more or less loose form of chemical combination. This is evidenced by the precipitation of sulphur from concentrated solutions on dilution, and the generation of heat when sulphur dissolves in sulphide or hydrosulphide solutions. It is certain that the sulphur of polysulphides is quite different from rhombic or α-sulphur, and that the aggregate S_8 is changed to the sulphur of polysulphides by the combined action of hydrogen sulphide and basic accelerators.

It is a well-known fact that sulphur will react with rubber resins and proteins at temperatures near 140 degrees with the formation of hydrogen sulphide. This hydrogen sulphide in the presence of basic accelerators forms hydrosulphides which in turn take up sulphur to form polysulphides These polysulphides pass on part of their sulphur to the rubber and constitute the true curing agents. Such a mechanism applies also to the curing action of alkali and alkaline-earth hydroxides. The fact that basic magnesium carbonate will react with hydrogen sulphide and sulphur in water suspension to form polysulphide solutions no doubt accounts for its mild accelerating power. Lime and magnesia do not function well in deresinated rubbers where much of the hydrogen sulphide producing materials have been removed. The sulphides and polysulphides of the alkali and alkaline-earth metals should function in deresinated or synthetic rubbers.

The relative accelerating power of the organic bases is dependent upon the facility with which they form polysulphides and the extent to which they are able to activate sulphur and make it available for the rubber. This will, in some measure, be dependent upon the basicity. In a previous paper by the writers[9] it was stated that at least a part of the accelerating action of hexamethylene tetramine is due to the fact that during the cure there are produced, among other products, ammonia and carbon disulphide which, alone or with basic products present in the rubber, form dithiocarbamates. It may be added that "Hexa" also forms hydrogen sulphide by sulphur reaction, which with the ammonia undoubtedly forms ammonium polysulphides. This accelerator may, therefore, be classed under both types since it is both a hydrogen sulphide and a carbo-sulphydryl polysulphide accelerator.

Aldehyde ammonia, by the action of heat alone, forms ammonia, while with sulphur it also gives hydrogen sulphide. Heat also produces other bases such as the alkyl pyridines or collidines. This material appears to be solely a hydrogen sulphide polysul-

[1]Presented before the Rubber Division at the meeting of the American Chemical Society, Chicago, Illinois, September 6-10, 1920: Part I, THE INDIA RUBBER WORLD, January 1, 1920, pages 206-207.

[2]The Goodyear Tire & Rubber Co., Akron, Ohio, and Quaker City Rubber Co., Philadelphia, Pennsylvania.

[3]Journal of Industrial and Engineering Chemistry, 12, 1920, 317.

[4]German patent No. 219,525.

[5]"Chemistry of India Rubber," page 47.

[6]Although the term polysulphide is applied to each class of accelerators, it should be noted that they are distinct types. In Class I, the polysulphide sulphur is related to a sulphydryl group attached to nitrogen, while in Class II the polysulphide sulphur is held by a sulphydryd group attached to carbon. In the so-called disulphides and their higher sulphides, the hydrogen of the sulphydryl group is considered as having been eliminated in hydrogen sulphide.

[7]Bedford and Scott, Journal of Industrial and Engineering Chemistry, 12, 1920, 31.

[8]The reaction of carbon disulphide on amines to form thioureas and hydrogen sulphide is reversible, and it is entirely possible that by the action of hydrogen sulphide during vulcanization the thioureas are changed to the more powerful dithiocarbamates which are intermediate to the complete transformation to amine and carbon disulphide. It is also possible that the thioureas may form polythio compounds direct, through the carbo-sulphydryl group.

[9]Journal of Industrial and Engineering Chemistry, 12, 1920, 31.

phide accelerator. The ammonia condensation products of other alipathic aldehydes behave in a similar manner.

p-Phenylenediamine is an accelerator that is much more active than would be assumed from its basicity. At curing temperatures, this accelerator reacts with sulphur to form large amounts of ammonia and hydrogen sulphide together with certain weaker bases. If the reaction be carried out under a cold reflux, the condenser will frequently become clogged with the white solid compounds of ammonia and hydrogen sulphide which are described by Roscoe and Schorlemmer. The action of *p*-phenylenediamine in the cure is entirely that of a hydrogen sulphide polysulphide accelerator.

The three above-mentioned accelerators are not dependent on the rubber resins or proteins for their supply of hydrogen sulphide, since this is one of their sulphur reaction products. It is to be expected that these accelerators will function in a deresinated or a synthetic rubber, and the Bayer patents state that this is true. It is also known that piperidine will cure in a nitrogen-free rubber, Here we have a strong base acting apparently without the aid of hydrogen sulphide. Piperidine, however, reacts with sulphur at temperatures lower than those used in vulcanization, with the formation of hydrogen sulphide. Both the sulphur reaction product and the unchanged piperidine may then use this hydrogen sulphide to form polysulphides with sulphur.

INORGANIC ACCELERATORS

Inorganic accelerators that function in the cure by the removal of hydrogen sulphide the writers choose to term "secondary accelerators," while those that function in the same manner as the organic polysulphide accelerators may be classed with them as "primary accelerators." A third class consists of those compounds that are both primary and secondary accelerators.

I. SECONDARY ACCELERATORS. Litharge, zinc, oxide, etc., seem to act no further than to form the corresponding sulphides, in connection with hydrogen sulphide polysulphides.

II. PRIMARY ACCELERATORS. To this class belong the sulphides and hydrosulphides of the alkali and alkaline-earth metals.

III. ACCELERATORS THAT ARE BOTH PRIMARY AND SECONDARY. Inorganic oxides and hydroxides function first as secondary accelerators forming sulphides or hydrosulphides which then take up sulphur and act as primary accelerators. Such accelerators are sodium and calcium hydroxides, magnesium oxide and basic carbonate, etc.

Secondary accelerators are believed to function as aids to organic polysulphides by breaking them up into colloidal sulphur and the original nitrogen base. This may be illustrated by the decolorization of polysulphide solutions by litharge or zinc oxide. Ferric oxide does not act as a secondary accelerator, and neither does it readily decompose the polysulphide solutions. The solubility of organic accelerators in sulphur and rubber gives them much more intimate contact with hydrogen sulphide at the time of its formation than is the case with the comparatively large particles of litharge or zinc oxide. Hydrogen sulphide is therefore available for the formation of organic polysulphides before being taken up by the secondary accelerators. The decomposition of a polysulphide by a secondary accelerator regenerates the free base, which with more hydrogen sulphide and sulphur re-forms the polysulphide. Secondary accelerators do not act as true catalysts; once formed into sulphides they do not react again with hydrogen sulphide.

SUMMARY

1. All organic accelerators are believed to function through the formation of some type of polysulphide.

2. Organic bases and compounds that form bases during vulcanization are believed to form polysulphides through the aid of hydrogen sulphide. These are termed "hydrogen sulphide polysulphide accelerators."

3. Thioureas, dithiocarbamates, thiurams, and mercaptan compounds are believed to form polysulphides directly, or by first forming disulphides, and are termed "carbo-sulphydryl polysulphide accelerators."

4. It is proposed that the function of such compounds as litharge and zinc oxide may lie in the decomposition of polysulphides into colloidal sulphur and amines.

5. Such inorganic compounds as sodium hydroxide, calcium hydroxide and magnesium oxide are believed to function as "primary accelerators" through the formation of inorganic polysulphides.

BENZOL POISONING IN RUBBER FACTORIES

THAT RUBBER MANUFACTURERS are eager to safeguard the health of their employes is evidenced in the exhaustive study being made by experts into the causes and prevention of the occupational diseases that have been incidental to the rubber industry. Typical of such valuable research work is the investigation recently made by Dr. Robert S. Quinby, of the Hood Rubber Co., of Watertown, Massachusetts, as to the manner in which benzol poisoning is occasioned, the best treatment for those affected by the noxious vapor, and the surest means for overcoming any menace to health from this source.

According to the report of the State Board of Labor and Industries of Massachusetts, five workers died within three years from the toxic action of benzol used in rubber works, but during the past year and a half there have been no deaths from this cause, the gratifying change for the better being due mainly to the fact that the use of benzol had been practically discontinued and that comparatively harmless rubber solvents have been substituted.

Dr. Quinby's inquiry has revealed the fact that most of the cases of poisoning in the rubber industry have been due to the use of pure benzol, rather than commercial benzol. The latter boils at or over 100 degrees C., while the former distills at 80.5 degrees C. Tests indicated that the toxicity of pure benzol is much greater than that of the commercial article, as the amount of vapor given off and breathed by operatives is larger with the benzol having a lower boiling point. Oddly enough, the vigorous, deep-breathing workers were more affected than those of apparently less physical resistance. Females appear to be more susceptible to the fumes than males. Hot, humid weather, in which such a solvent was more volatile, increased the susceptibility of workers to the toxic action. In a general sense those affected show symptoms closely resembling indications of pernicious anemia. Poisoning by benzol is usually due to breathing the fumes, but, like aniline, it may also be absorbed through the skin.

As a prophylactic measure, it is suggested that whenever possible benzol should be replaced with solvent naphtha, xylol, toluol, carbon tetrachloride, or xylol compound. Where benzol must be used, it is advised that ample ventilation be provided, that all benzol operations be carried on in closed containers, and provision made for the filling of containers by gravity from storage tanks, or by other mechanical means. Examination of workers exposed to benzol fumes should be made at least once a month, especially to determine the condition of the blood (diminution of white blood cells being a characteristic symptom of poisoning), and none with heart or kidney disease should be permitted to be exposed to the vapor of benzol.

TIRE BUILDERS AFFLICTED

All of the five cases referred to occured in the tire-building department of a rubber works, where benzol had been used in a cement and where it was customary to wipe tires with a cloth saturated with benzol prior to vulcanization. The process was repeated about every half hour, or about eighteen times in an 8-hour day. In the case of one man who succumbed to the poison, it is stated that he was thirty-three years old, had been working eight years in a rubber factory, and that he had not been working long in the tire-building department to which he had been trans-

ferred, before he complained of severe headaches, often lasting two and three days. Within eleven months he noticed that his gums bled freely after brushing his teeth. A month later, in addition to spongy gums, he remarked bluish-green spots on his left thigh, followed in a few days with similar spots on his left arm. Spots on other parts of his body soon appeared, and within a couple of months he had to give up work on account of weakness and shortness of breath. Severe nosebleeds followed, and he was removed to a hospital.

Clinical examination revealed a steady drop in the hæmoglobin percentage in the blood, and a particularly rapid drop in the count of white blood corpuscules, as from 5,000 to 850 in nine days, while the red count in the same period fell from 2,288,000 to 1,616,000. A transfusion of ten ounces of blood was made, but this was succeeded by an uncontrollable nosebleed, headache, vertigo, dizziness, restlessness, delirium, talkativeness, loss of power of arms and legs and finally coma convulsions and death, twenty-eight days after he had started to work in the tire-building department.

OTHER FATAL CASES

Another man, forty years old, after working in other parts of a rubber factory for ten years, was transferred to the tire-building department. Severe weakness and shortness of breath began to trouble him within six months. Then followed nosebleeds and bloody stools, spongy gums, discoloration of arms and legs, finally paralysis, delirium, and death within just one year.

A man, thirty-three years old, after working in the tire-building department of a rubber factory two years, developed "red spots" on face and neck, then followed general weakness, loss of weight, shortness of breath, rapid pulse, dry cough, anemia, persistent nosebleed, brownish-yellow stains on both sides, and finally pneumonia and death, two years after working with benzol.

In one non-fatal case, a worker, twenty years old, who had been using benzol cement on cured tires developed anasymetry of the face which he believed due to tooth extraction, with headache, nausea, and general weakness. A blood count showed the characteristic effects of benzol poisoning.

In the case of another worker, twenty-nine years old, who for two years had been applying benzol to tire fabric, a pin-head eruption appeared on his arms, feet, ears, and neck, and this developed into very itchy blebs with fever. He stated that about eighteen others suffered similarly; but all symptoms disappeared among the workers when naphtha was substituted for benzol.

QUOTES MANY AUTHORITIES

Dr. Quinby's conclusions were confirmed by the observations of many investigators in America and abroad who have studied the effects of benzol and related volatile hydrocarbons in the rubber, painting, chemical, and other industries, as well as by the reports of many health boards and trades unions in the United States, Great Britain, France, Germany, Italy, and other countries, his references totaling forty-seven. But little information is as yet available on this subject, he says, in medical text books.

Foreign Import Duties on Boots and Shoes

THE FOLLOWING TABLE, corrected to April 16, 1921, by the Bureau of Foreign and Domestic Commerce, shows the foreign import duties on rubber boots and shoes of all descriptions, imported into the various countries from the United States.

Owing to the frequency of tariff changes the figures and information given in this table should be periodically verified. It is also advised that small trial shipments be made in order to test the rates prior to sending more extensive shipments.

In the first column is given the country, while the next column contains the articles with notes regarding surtaxes, basis of rates, etc. The third column specifies whether the weight is to be taken as gross or net, and the last gives the ad valorem duty or the rate of specific duty in United States currency.

COUNTRIES	ARTICLES AND REMARKS	Weight	Duty (U. S. Currency)
EUROPE:			
Austria-Hungary	Shoemakers' wares, with textile goods, per 100 pounds	Net	$11.05
Belgium	Manufactures of india rubber, ad valorem	...	10%
Bulgaria	Ordinary rubber boots and shoes (galoshes), per 100 pounds (includes 20 per cent surtax)	Net	$10.51
	Other rubber boots and shoes, per 100 pounds (includes 20 per cent surtax)	Net	21.01
Denmark	Rubber boots and shoes, with textiles, per 100 pounds—including inner packing	Legal	6.03
Finland	Rubber footwear, per 100 pounds	Legal	10.51
France	Rubber footwear lined with felt, wool, or any partly woolen cloth, per 100 pounds	Net	27.57
	Rubber footwear lined with cotton, hemp, or flax cloth, per 100 pounds	Net	22.07
	Footwear with soles of rubber, per pair	...	0.29
Germany	Footwear, with or without rubber soles—Unvarnished, per 100 pounds	Net	7.56
	Varnished, per 100 pounds	Net	8.64
Great Britain	Manufactures of rubber	...	Free
Greece	Galoshes of rubber, per 100 pounds	Net	$30.78
Italy	Rubber footwear, lined or trimmed with fabrics, per 100 pairs	...	38.60
	Other rubber footwear, per 100 pounds	Net	4.38
Jugo-Slavia	Rubber footwear with or without textile materials, per 100 pounds	...	12.26
Netherlands	Rubber footwear, ad valorem	...	5%
Norway	Rubber footwear, per 100 pounds	Net	$12.16
Portugal	Rubber footwear, per 100 pounds	Net	38.44
Rumania	Rubber footwear, per 100 pounds	Legal	10.51+2%
Servia	Rubber footwear, per 100 pounds	Net	12.26
Spain	Rubber footwear, per 100 pounds	Net	26.26
Sweden	Rubber footwear, per 100 pounds	Net	14.59
Switzerland	Rubber footwear, per 100 pounds	Gross	2.63
Turkey	Articles not specified	Net	11%
NORTH AMERICA:			
Canada	Rubber boots and shoes, ad valorem	...	25%
	Imports of articles invoiced at prices less than the market value in the country from which exported, are liable to a "dumping" duty if such articles are also made in Canada.		
Newfoundland	Footwear and all manufactures in part or in whole of india rubber or gutta percha, ad valorem, including 10 per cent surtax	...	44%
CENTRAL AMERICA:			
*Costa Rica	Rubber footwear, per 100 pounds	Gross	$21.09
Guatemala	Boots and shoes, and overshoes of rubber or rubberized cloth, per 100 pounds	Legal	90.76
†Honduras	Rubber boots and shoes, per 100 pounds	Gross	24.96
Mexico	Footwear of rubber or cloth and rubber, including variable surtax taken as equivalent to 3 per cent of the duty, per 100 pounds	Legal	23.29
Nicaragua	Footwear of rubber such as waterproof boots and shoes, per 100 pounds	Net	22.73
Panama	Rubber footwear, ad valorem	...	15%
Salvador	Rubber footwear, per 100 pounds	Gross	$46.14
WEST INDIES:			
Cuba	Rubber footwear with cotton fabrics, per 100 pounds	Legal	10.32
	Rubber footwear with woolen fabrics, per 100 pounds	Legal	17.09
Dominican Republic	Rubber footwear, per 100 pounds	Net	11.35
Haiti	Rubber shoes or footwear with rubber soles, per dozen pairs	...	0.99
St. Vincent	Manufactures of rubber, ad valorem	...	12.5%
Virgin Islands	Imports from the United States	...	Free

SOUTH AMERICA:			
Argentina	Rubber footwear—includes surtax of 7 per cent—duty based on valuation of $65.66 per 100 pounds.	...	47%
	Footwear of cloth and rubber, whole sole measures 25 centimeters (9.84 inches) or less, duty based on valuation of $157.58 per 100 pounds, includes surtax of 7 per cent of valuation.	...	47%
	Same footwear, larger sizes, duty based on valuation of $367.69 per 100 pounds, includes surtax of 7 per cent.	...	47%
Bolivia	Rubber footwear, per dozen pairs.	...	6.22
‡Brazil	Rubber footwear—nominally 3 milreis per kilo—per 100 pounds.	Legal	$51.93
	(Footwear made of Pará rubber, 5 per cent of the rate shown.)		
Chile	Rubber footwear of all kinds, per 100 pounds.	Net	49.66
Colombia	Rubber footwear, including surtax of 7 per cent of duty, per 100 pounds.	Gross	48.53
Ecuador	Rubber footwear, per 100 pounds.	Net	30.02
Paraguay	Rubber footwear, includes surtax of 1½ per cent of valuation, based on valuation of $78.79 per 100 pounds	...	63.5%
Peru	Rubber footwear, including weight of inner packing; at ports of Callao, Salaverry, Mollendo, Ilo, Paita and Pisco, surtax of 20 per cent of duty; per 100 pounds.	Legal	42.38
	At other ports, 18 per cent; per 100 pounds.	Legal	41.68
Uruguay	Rubber footwear, based on valuation of $5.17 per dozen pairs—surtax of 14 per cent of valuation included	...	62%
Venezuela	Rubber footwear, including surtax of 56.55 per cent per 100 pounds.	Gross	$34.26
ASIA:			
Ceylon	Rubber footwear, ad valorem.	...	7.5%
China and Manchuria	Rubber boots }	... }	5%
	Rubber shoes } ad valorem	... }	
Japan	Rubber boots, per 100 pounds.	Net	18.82
	Rubber shoes, per 100 pounds.	Net	21.79
	Rubber overshoes, per 100 pounds.	Net	19.43
OCEANIA:			
Australia	Galoshes, rubber sand boots and shoes, and plimsolls, ad valorem.	...	35%
	Rubber gum and wading boots, ad valorem	...	10%
New Zealand	Rubber footwear, ad valorem.	...	34¼%
Guam	Products of the United States.	...	Free
Philippine Islands	Products of the United States.	...	Free
Tutuila	Articles not specified.	...	10%
AFRICA:			
Algeria	Same as France.	...	.....
Egypt	Articles not specified.	...	8%
Eritrea	Articles not specified.	...	8%
Liberia	Articles not specified.	...	12½%
Libya	Articles not specified.	...	11%
Mauritius	Articles not specified.	...	12%
Morocco	Articles not specified.	...	12½%
Nigeria	Articles not specified.	...	Free
Somaliland (Italian)	Articles not specified.	...	15%
South Africa	Rubber footwear, ad valorem.	...	20%
With a minimum per pair of—			
	Men's	...	$0.18
	Women's	...	0.12
	Children's	...	0.06
Zanzibar	Articles not specified.	...	7½%

Legal weight is not uniformly construed, but generally includes the weight of the immediate packing or container, though in some countries fixed tare allowances are made. In Argentina, Bolivia, Paraguay, and Uruguay, the duties are to be computed upon the official valuations at the rates given in the last column.

*Imports for provinces of Limón, plus surtax of 5 per cent ad valorem. Imports for interior provinces, plus 2 per cent ad valorem.

†Imports into Amalpa, surtax of 13.75 cents per quintal of 101.4 pounds.

‡There is 20 per cent reduction on these goods imported from United States.

Foreign Import Duties on Rubber Tires

THE FOLLOWING TABLE, corrected to April 16, 1921, by the Bureau of Foreign and Domestic Commerce, shows the foreign import duties on rubber tires of all descriptions imported into the various countries from the United States.

The column marked "Weight" shows whether duties are levied on net or gross weight, or include simply the inner packings. The next two columns give the rate of the duty for each one hundred pounds in United States currency or the rate per cent ad valorem.

In the following monograph the surtaxes have been included and the converted rates therefore indicate the actual duty payable.

Certain charges, such as warehousing, customs handling, local taxes, revenue stamps, etc., are not included. The rates of duty shown, including the surtaxes as noted, should therefore be regarded as the minima. As changes in duties are likely to occur at any time, frequent verification of these figures is advised.

COUNTRIES	Weight	Rate per 100 Pounds, U. S. Currency	Rate Per Cent Ad Valorem
NORTH AMERICA			
Canada	.....	.....	35
(Ad valorem duties are based on the fair market value of the articles when sold for home consumption in the country whence exported direct to Canada.)			
Central American States—			
British Honduras	.....	.....	15
(Duties based on price in the port of export.)			
*Costa Rica	Gross	$4.22	.....
Guatemala	Gross	90.76	.....
Honduras—Motorcycle tires	Gross	12.48	.....
Automobile tires	Gross	4.99	.....
(Imports into Amalpa—surtax of 14 cents per quintal of 101.4 pounds.)			
Nicaragua—Auto tires, inner tubes, solid tires, motorcycle tires, etc.	Net	30.62	.....
(Includes surtax of 12½ per cent of duty.)			
Panama	.....	.....	15
Salvador	Gross	13.81	.....
(A surtax of 1½ per cent of the duty is included.)			
Hawaii	.....	.....	Free
(Imports from foreign countries are subject to the provisions of the United States tariff.)			
Mexico—Auto tires	.....	24.85	.....
Truck tires	.....	12.43	.....
(A surtax of 10 per cent of the duty is included.)			
Newfoundland	.....	.....	49.5
(A surtax of 10 per cent of the duty is included.)			
West Indies—			
British—			
†Antigua	.....	.....	13.33
Bahamas	.....	.....	12.5
†Barbados	.....	.....	11.25
‡Bermuda	.....	.....	.....
†Dominica	.....	.....	12.5
†Grenada	.....	.....	15
Jamaica	.....	.....	16.66
†Montserrat	.....	.....	13.33
†St. Christopher-Nevis	.....	.....	11
†St. Lucia	.....	.....	16.5
†St. Vincent	.....	.....	10
†Trinidad and Tobago	.....	.....	15
Turks and Caicos Islands	.....	.....	10
Virgin Islands	.....	.....	10

*Imports for provinces of Limón, plus 5 per cent of duty. Imports for interior provinces, plus 2 per cent of duty.

†When imported from the United Kingdom, Canada or Newfoundland, admitted at a reduction of one-fifth of the duty. The cost of packing is excluded, except in Dominica, St. Lucia and Grenada, where it is included.

‡Automobiles and motorcycles prohibited.

COUNTRIES	Weight	Rate per 100 Pounds, U. S. Currency	Rate Per Cent Ad Valorem
Cuba	.....	.....	25
Dominican Republic—Tires for autos, bicycles, etc..	Net	5.67	.....
Tires for trucks	.....	Free	.....
French—			
Guadeloupe	.....	.....	6
Martinique (rates not specified)	.....	.....	.....
(Imports of other than French origin pay also the regular French import duties.)			
Haiti	.....	.....	24
Porto Rico	.....	.....	Free
(Imports from foreign countries are subject to the provisions of the United States tariff.)			
Virgin Islands of the United States..	.....	.....	Free
(Imports from foreign countries are temporarily subject to the duties formerly in force in the Danish West Indies.)			
SOUTH AMERICA:			
Argentina—Rubber casings } Tubes } Solid tires.	Legal	.....	32
(Valuation $105.06 per 100 pounds.)			
Non-skid casings	Legal	.....	32
(Valuation $78.79 per 100 pounds.)			
Pneumatic tires and tubes for cycles and motorcycles...	Legal	.....	32
(Valuation $120.84 per 100 pounds.)			
(Rate per cent includes surtax of 7 per cent ad valorem.)			
Bolivia—Solid tires	Legal	17.64	.....
Pneumatic tires	Legal	52.93	.....
Brazil—Auto tires	.....	.....	46.28
Pneumatic tires of Pará rubber	.....	.....	20.57
(Duties given are actual ad valorem duties. Nominal ad valorem duties are 15 and 5 per cent respectively.)			
Chile	Gross	9.93	.....
Colombia	Gross	0.91	.....
Ecuador	Net	9.93	.....
Guiana—British	.....	.....	20
(When imported from the United Kingdom, Canada or Newfoundland, admitted at a reduction of one-fifth of the duty.)			
Dutch	.....	.....	11
French	.....	.....	5
(The regular French import duties are also collected on goods not of French origin.)			
Paraguay—Casings, tubes, solid tires...	.....	.....	43.5
(Valuation, $140.07 per 100 pounds.)			
Non-skid attachments	.....	.....	43.5
(Valuation, $105.05 per 100 pounds. Includes surtax of 1.5 per cent ad valorem.)			
Peru—Articles of soft rubber, not specified	Legal	35.32	.....
Articles of hard rubber not specified	Legal	52.98	.....
(At Callao, Salaverry, Mollendo, Ilo, Paita and Pisco a surtax of 20 per cent of duty is levied; at other ports, 18 per cent.)			
Uruguay	.....	.....	45
Venezuela	Gross	6.57	.....
EUROPE:			
Austria-Hungary	Net	13.81‡	.....
Belgium—Solid tires	Net	11.38	.....
Casings for autos and motorcycles	Net	20.31	.....
Casings for other vehicles, weighing each:			
Under 600 grams	Net	15.76	.....
600 grams or more	Net	10.51	.....
Inner tubes for:			
Autos and motorcycles	Net	29.77	.....
Other vehicles	Net	26.26	.....
Bulgaria—Tires and tubes	Net	5.25	.....
Czecho-Slovakia—Pneumatic tires and tubes	.....	13.13	.....
Denmark—Auto tires	Net	6.08	.....
Solid tires	Net	.....	Free
Combined with textiles	Net	1.94	.....
Faroe Islands	.....	.....	Free
Finland—All tires, without rims	Net	52.12	.....
With rims	Net	31.51	.....
France—Auto tires and tubes	Net	17.08	.....
Solid tires	Net	11.38	.....
Cycle tires	Net	37.55	.....
Germany—Auto tires	Net	6.48	.....
Inner tubes	Net	6.48	.....
Gibraltar	.....	.....	Free
Greece	Net	1.03	.....
Iceland	Net	0.24	.....
Italy—Auto tires and tubes	Net	5.25	.....
Jugo-Slavia	.....	10.51	.....
(These duties to be increased 100 per cent. There is a 10 per cent surtax on luxuries.)			
Malta	.....	.....	15
Netherlands	.....	.....	5
Norway—Auto tires	Net	3.65	.....
Motorcycle tires	Net	3.65	.....
Poland	Legal	10.79	.....
Portugal	Net	1.60	.....
(Conversion to U. S. currency is based on the latest quotation of the paper milreis.)			
Rumania—Auto tires	Legal	8.75	.....
Solid tires	Legal	4.38	.....
Servia	Net	13.16	.....
Spain—Solid tires	Net	17.51	.....
Casings and inner tubes	Net	70.91	.....
Sweden—Solid tires	Net	9.73	.....
Tires for motorcycles	Net	19.45	.....
Auto tires, tubes, casings	Net	14.59	.....
Switzerland—Solid tires	Gross	0.09	.....
Pneumatic tires, tubes, casings	Gross	0.44	.....
Solid tires with fabric or metal	Gross	0.44	.....
Pneumatic tires, tubes, casings, with valves, etc.	Gross	0.70	.....
Non-skid tires with leather or steel protectors	Gross	2.20	.....
Turkey	.....	11.00	.....
United Kingdom	.....	.....	Free
ASIA:			
British—			
Aden	.....	.....	Free
Ceylon	.....	.....	7.5
(Duty based on wholesale cash price in bond, less trade discount at the port of entry.)			
Cyprus	.....	.....	8
(Duty based on export price with addition of cost of transport [including insurance] to the port of final discharge.)			
Federated Malay States	.....	.....	10
Hongkong	.....	.....	Free
India	.....	.....	20
(See note for Ceylon.)			
North Borneo	.....	.....	10
Sarawak	.....	.....	Free
Straits Settlements	.....	.....	Free
China	.....	.....	5
Dutch East Indies	.....	.....	10
French Indo-China	.....	.....	.....
(Imports from France are admitted free of duty, while imports from other countries are subject to the rates prescribed by the customs tariff of France.)			
Japan (including Formosa and Chosen)—			
Auto tires	.....	.....	25
Cycle tires	Net	42.92	.....
Persia	.....	.....	12
Siam	.....	.....	3
Syria	.....	.....	11%+ 1% if imported through Egypt.
AFRICA:			
Abyssinia	.....	.....	10
Belgian Congo	.....	.....	10
British—			
Mauritius	.....	.....	12
Nigeria	.....	.....	Free
Union of South Africa	.....	.....	20
(Duty based on the current value for home consumption at the place of purchase, including value of packing and agent's commission if it exceeds 5 per cent.)			
Zanzibar	.....	.....	7.5
(The dutiable value of imports from Europe or America is taken to be the cost price [with charges], increased by 5 per cent or the invoice price [exclusive of charges], increased by 15 per cent.)			
Egypt	.....	.....	8
(In Alexandria a wharfage tax of one-half of 1 per cent is added. At other ports different rates are imposed.)			
French Algeria	.....	.....	.....
(Imports from France are admitted free of duty, while imports from other countries are subject to the rates prescribed by the customs tariff of France.)			
Italian—			
Eritrea	.....	.....	8
Libia	.....	.....	11
Somaliland	.....	.....	15
Liberia	.....	.....	12.5
Morocco	.....	.....	12.5
OCEANIA:			
British—			
Australia	.....	.....	40
(Duty based on fair market value F. O. B. at port of export, plus 10 per cent. On casings weighing over 2½ pounds and inner tubes over 1 pound each, 48.6 cents per pound, if higher than the ad valorem rate.)			
New Zealand	.....	.....	1
Guam	.....	.....	Free
(Imports of foreign origin are taxed 25 per cent of their value.)			
Philippine Islands	.....	.....	Free
(Imports of foreign origin are taxed 25 per cent of their value.)			
Tutuila	.....	.....	10

Conversion made at normal rate of exchange except where otherwise stated.

Legal weight is not uniformly construed, but generally includes the weight of the immediate packing or container, though in some countries fixed tare allowances are made.

BUREAU OF AIRCRAFT PRODUCTION, UNITED STATES ARMY

SPECIFICATIONS OF ELASTIC CORD FOR HOLT FLARE BRACKET TENSION STRAP

Specification No. 26,503, November 14, 1918

GENERAL

1. This specification covers the requirements of the Bureau of Aircraft Production for an elastic cord for Holt flare bracket tension strap.

MATERIAL

2. The elastic cord shall be made of multiple strands of rubber tightly encased within two layers of cotton braid.

Braid

3. The inner braid shall consist of from 30 to 40 white threads with a soft finish of 16/4 ply or equivalent.
4. The outer braid shall consist of from 30 to 40 white threads with a hard finish of 16/4 ply or equivalent.
5. Both the inner and outer braids shall be wrapped over and under with two or three threads.

Rubber

6. The cord strands shall be made of a compound containing not less than 90 per cent of the best Pará rubber.

MANUFACTURE AND TOLERANCES

Strands

7. The rubber strands shall be square. In a given cord the strands must be of the same size in cross-section. This size shall be between 0.05 and 0.035-inch.
8. The strands shall be thoroughly treated with soapstone or talc to prevent them from adhering to each other in the finished cord.

Cord

9. The diameter specified is the overall diameter of the braid with rubber strands inclosed. A tolerance of minus zero or plus 3/64-inch will be allowed on the overall diameter.

TESTS

10. The extension of a rubber strand at breaking load must not be less than 700 per cent. The measurement shall be made on a two-inch length.
11. A specimen of each finished cord shall be tested by stretching to double its normal length. The braid must show no evidence of failure under this test. The load required to produce this extension must not be less than that given in Table 1. This test shall be made on a specimen with a gage length of six inches on specimen, at a temperature of 60 to 75 degrees F.
12. One test specimen shall be tested for each 500 feet of finished cord unless in the judgment of the inspector the uniformity of the cord can be ascertained with fewer samples.

TABLE 1

LOADS FOR 100 PER CENT EXTENSION

Diameter of finished cord, inch	Load to give 100 per cent extension, pounds
3/8	25-35

MARKING

13. Each roll of finished cord shall be plainly marked with the date of manufacture of the cord, preferably on a tag of permanent nature fixed to the cord.

INSPECTION

14. Elastic cord shall not be used for making Holt flare bracket tension straps after six months from the date of its manufacture.
15. Materials and finished cord shall be subject to inspection by the Inspection Department of the Bureau of Aircraft Production under its Manual of Inspection.
16. The Bureau of Aircraft Production inspector shall have full and free access to all parts of the manufacturer's plant concerned in the manufacture of the elastic cord.

EXERCISER ELASTIC CORD FOR AIRPLANE TYPES A AND B FLEXIBLE GUN MOUNTS

Specification No. 26,502, November 7, 1918

GENERAL

1. This specification covers the requirements of the Bureau of Aircraft Production for elastic cord to be used on airplane types A and B flexible gun mounts, to counteract the weight of one or two flexible guns.

MATERIAL

2. The elastic cord shall be made of multiple strands of rubber tightly encased within two layers of cotton braid.

Braid

3. The inner braid shall consist of from 36 to 48 white threads with a soft finish of 16/4 ply or equivalent. Single threads must have a tensile strength of four (4) pounds.
4. The outer braid shall consist of from 60 to 80 white threads with a hard finish of 16/4 ply or equivalent. Single threads must have a tensile strength of five and one-quarter (5¼) pounds.
5. Both the inner and outer braids shall be wrapped over and under with three or four threads.

Rubber

6. The cord strands shall be made of a compound containing not less than 90 per cent of the best Pará rubber.

MANUFACTURE AND TOLERANCES

Strands

7. The rubber strands shall be square. In a given cord the strands must be of the same size in cross-section. This size shall be between 0.05 and 0.035-inch.
8. The strands shall be thoroughly treated with soapstone or talc to prevent them from adhering to each other in the finished cord.

Cord

9. The overall diameter of the braid with rubber strands inclosed shall be 7/16-inch. A tolerance of minus zero or plus 1/16-inch will be allowed on the overall diameter.

TESTS

10. The extension of a rubber strand at breaking load must not be less than 700 per cent. The measurement shall be made on a two-inch length.
11. A specimen of each finished cord shall be tested by stretching to double its normal length. The braid must show no evidence of failure under this test. The load required to stretch a 7/16-inch cord from normal length of 12 inches to 18 inches shall be from 18 to 24 pounds.
12. One test specimen from each 500 feet of finished cord shall be tested unless, in the judgment of the inspector, the uniformity of the cord can be ascertained with fewer samples.

MARKING

13. Each roll of finished cord shall be plainly marked with the date of manufacture of the cord, preferably on a tag of permanent nature fixed to the cord.

INSPECTION

14. No elastic cord shall be used for making flexible gun mounts after six months from the date of its manufacture.
15. Materials and finished cord shall be subject to inspection by the Inspection Department of the Bureau of Aircraft Production under its Manual of Inspection.
16. The Bureau of Aircraft Production inspector shall have full and free access to all parts of the manufacturer's plant concerned in the manufacture of the elastic cord.

Communications regarding all technical matters pertaining to specifications should be addressed to the Specification Section, Bureau of Aircraft Production, United States Army, Dayton, Ohio.

SPECIFICATIONS OF THE BUREAU OF AIRCRAFT PRODUCTION, UNITED STATES ARMY

RUBBER BAGS FOR GASOLINE TANKS

Specification No. 16,024, October 30, 1918

GENERAL

1. This specification covers the general requirements of the Bureau of Aircraft Production for rubber bags for gasoline tanks.
2. Production engineering drawings for each size bag shall form a part of this specification, and may be obtained on application to the Instrument Department, Production Engineering.
3. Bureau of Standards Circular No. 38, on "The Testing of Rubber Goods," shall form a part of this specification.
4. USE. The bags are for use on airplane gasoline tanks to catch and conduct away gasoline which may leak from punctures in the tank.
5. DURABILITY. The bags must withstand the weather conditions encountered at varying altitudes and their life must be such as is indicated by the nature of the rubber compound.
6. DIMENSIONS. The bags shall conform to the dimensions called for on the drawings or in the order.

MATERIAL

7. The material from which the bags and other rubber pieces are made shall contain 92 per cent by weight of new washed and dried hard fine Pará or the highest grade only of new Hevea plantation rubber, 6 per cent by weight of sulphur and 2 per cent by weight of magnesium oxide.

8. The rubber compound shall be properly vulcanized and shall have all the characteristics of a compound of the above composition.

9. The fabric strips and all other fabric pieces shall be made of cotton duck weighing about ten (10) ounces to the square yard. The count per square inch of the warp and filler shall be approximately equal.

10. The fabric strips and all other fabric pieces shall be "frictioned" and "skim-coated" on both sides with the rubber compound specified in paragraph 7, and must be properly vulcanized to the bag to give a good adhesion.

Lacing Cord

11. The cord for lacing together the two portions of the bag shall be a Venetian blind cord or equal, of such size as to enable it to just pass through the holes of the eyelets. The ends of the cord shall be dipped in waterproof stiffening material to facilitate lacing.

Grass Mat

12. The mat to be used between the rubber bag and the gasoline tank shall be an unwoven grass mat, approved by the Instrument Department, Production Engineering.

MANUFACTURE

13. The bag shall be smooth and free from pitting or other imperfections. It shall have a uniform thickness of 1/16-inch, and shall be plied on the calender into a solid body, free from air. No minus variation in thickness will be allowed.

14. All pieces of fabric or rubber shall be vulcanized to the bag by heat at the same time the bag is vulcanized.

15. Joints shall be thoroughly cleaned before being overlapped or covered.

FACILITIES FOR TESTING

16. The manufacturer shall provide the necessary testing equipment, approved by the Inspection Department. He shall provide the necessary assistants for making the tests.

17. Tests shall be made at the manufacturer's plant or at a place designated by the Inspection Department.

18. The manufacturer shall bear the cost of all tests and shall supply the material ready for testing without additional cost to the purchaser. When bags are not tested at the manufacturer's plant, the manufacturer shall pay all cost of transportation in addition to the cost of the tests.

Test Specimens

19. The manufacturer shall, at his expense, furnish with each "heat" of bags a sample of vulcanized rubber at least eight (8) inches square and 1/16-inch thick. A fabric strip, one and three-quarters (1¾) inches wide and eight (8) inches long, shall be wholly vulcanized to the rubber along one edge.

20. The manufacturer shall guarantee that the sample furnished was vulcanized with and under the same conditions as the bag which it represents. He shall also guarantee that the materials in the sample are the same as those used in the bags.

Tensile Test Specimens

21. Tensile test specimens of the rubber shall be cut with a die from the sample furnished by the manufacturer or from a sample bag.

22. Additional test specimens of rubber shall be cut from the sample bag in such manner as to include a joint in the rubber between the component pieces of the bag. The sample must be cut at right angles to the joint so as to include the joint in the center of the constricted portion.

23. The constricted portion of the specimens shall be one-quarter (¼) inch wide, and shall have smooth edges.

Friction Test Specimens

24. Friction test specimens shall be cut to a width of one (1) inch from the sample furnished by the manufacturer or from a sample bag.

TESTS

Tensile Test

25. The tensile strength of the specimens selected as specified in paragraph 21, must be at least eighteen hundred (1800) pounds per square inch.

26. The elongation of a two-inch section at the breaking point must be at least 700 per cent.

27. The permanent elongation must not exceed 12½ per cent when the specimen is stretched from two inches to fifteen inches, held in the stretched position for ten minutes, and then released for ten minutes.

28. The specimens selected as specified in paragraph 22 must not fail in the joint.

Friction Test

29. The "friction," or the adhesion of the fabric strips to the rubber body, must be such that a load of 12 pounds shall not cause a separation at a rate greater than one inch per minute.

INSPECTION, REJECTION AND REPLACEMENNT

30. All finished bags, and all materials used in the construction thereof, shall be subject to inspection by the Inspection Department of the Bureau of Aircraft Production under its Manual of Inspection.

31. Acceptance or approval of materials in process shall in no case be construed as a guaranty of acceptance of the finished articles.

32. The inspector shall have full and free access to all parts of the manufacturer's plant concerned in the manufacture of these bags, and the manufacturer shall at all times afford him adequate facilities for determining that the materials and the bags conform to this specification. The inspector shall also be afforded opportunity to check and mark all materials in process or in stock.

33. The manufacturer shall furnish adequate private office space and office furniture for the use of the chief inspector and assistants.

34. All accepted bags shall be plainly stamped with the official acceptance stamp of the Bureau of Aircraft Production.

35. Rejected bags shall not be resubmitted after replacement of defective material without the express consent of the chief inspector.

36. The manufacturer's name or trade mark, the Bureau of Aircraft Production order number, size of bag, and the date of manufacture, shall be permanently impressed on the two sections of the bag.

37. The manufacturer shall pack with each bag the proper length of cord for lacing together the two portions of the bag.

38. The manufacturer shall also pack with each bag sufficient grass matting to completely envelop the tank.

39. The manufacturer shall furnish and pack with each bag printed instructions, approved by the Bureau of Aircraft Production, for its installation. A small envelope to contain these instructions shall be supplied, printed as follows:

IMPORTANT

DO NOT THROW THIS ENVELOPE AWAY. IT CONTAINS INSTRUCTIONS FOR INSTALLING RUBBER BAGS ON GASOLINE TANKS.

40. The bags shall be packed for domestic or overseas shipment as directed by the purchaser.

RUBBER GASKETS FOR GASOLINE TANK FITTINGS

Specification No. 16,008-A, September 25, 1918.—Supersedes Specification No. 16,008

16,008

GENERAL

1. This specification covers the general requirements of the Bureau of Aircraft Production for rubber gaskets to be used on gasoline tank fittings.

MATERIAL

2. The material from which the gaskets are made shall contain not less than 32 per cent of washed and dried fine Pará or first latex crêpe, not more than 1 per cent of free sulphur, with the remainder suitable dry inorganic mineral fillers.

3. The rubber compound shall be properly vulcanized and have all the characteristics of a compound of the above composition.

MANUFACTURE

4. Gaskets shall be cut on a lathe, molded or stamped from the vulcanized rubber compound.

5. Gaskets must have smooth faces.

6. DIMENSIONS. Gaskets shall conform to the dimensions called for on the drawings or in the order.

INSPECTION

7. The inspector shall have free access to all parts of the plant where the gaskets are being manufactured and shall be afforded every reasonable facility to satisfy himself that they are in accordance with this specification.

Communications regarding all technical matters pertaining to specifications should be addressed to the Specification Section, Bureau of Aircraft Production, U. S. Army, Dayton, Ohio.

What the Rubber Chemists Are Doing

THE RELATIVE ACTIVITY OF VARIOUS ALLOTROPIC FORMS OF SULPHUR TOWARDS CAOUTCHOUC[1]

By D. F. Twiss and F. Thomas

THE INVESTIGATIONS in recent years of the allotropic forms of sulphur capable of existence within the range of temperature used in ordinary vulcanization, naturally prompt enquiries as to a possible difference in the activity of these various modifications of the vulcanizing agent. The forms most likely to be involved are (*a*) $S\lambda$, the modification represented by ordinary crystalline sulphur, (*b*) $S\mu$, the insoluble modification constituting part of genuine "flowers of sulphur" and corresponding with the viscous constituent of molten sulphur, and (*c*) $S\pi$, a more brightly colored and more soluble variety, present in a small proportion with much $S\lambda$ in the equilibrium mixture yielded by ordinary sulphur at temperatures a little above its melting point; the proportion of $S\pi$ increases markedly if the temperature is raised to 140 degrees or higher.

Tests made with mixtures of rubber with soluble sulphur ($S\lambda$) and insoluble sulphur ($S\mu$) respectively, under ordinary technical conditions, indicate that the vulcanizing effect of these two varieties is practically the same; this result, however, is probably to be attributed to the rapid change of $S\mu$ at such temperatures into the equilibrium mixture consisting mainly of $S\lambda$ with some $S\pi$.

Between 128 degrees and 168 degrees C. the temperature coefficient of the chemical reaction between rubber and sulphur, i.e. the proportion by which the rate is increased on raising the temperature 10 degrees C., is surprisingly constant, and in view of the alteration of the composition of the equilibrium mixture with rise of temperature, the comment has been made that this is indicative of comparable vulcanizing capacity on the part of the modifications present.

Although the difference observable between the forms of sulphur naturally existent at ordinary vulcanizing temperatures is thus shown to be relatively slight, it must be remembered that under such conditions the sulphur will undergo fusion and then rapidly yield the equilibrium mixture. If the temperature could be maintained much lower, the rate of attainment of equilibrium could be reduced and the increased persistence of each form would afford greater opportunity for observing any difference in vulcanizing capacity. The use of a suitable vulcanization catalyst, e. g., aldehyde-ammonia, enables experiments to be made at a sufficiently low temperature. It is a little unfortunate that the powerful organic catalysts generally should be basic substances such as also tend to catalyze the mutual interconversion of the sulphur allotropes, but as is demonstrated by the results now submitted, the disturbance from this direction is not sufficient to mask completely the sought effect.

In the first set of experiments the varieties of sulphur used were (*a*) a high grade finely powdered sulphur soluble in carbon bisulphide and consisting entirely of $S\lambda$, and (*b*) an extracted sublimed flowers of sulphur 93 per cent insoluble in carbon bisulphide and consisting mainly of $S\mu$. Mixtures were made of each of these with selected pale crêpe rubber of known rate of vulcanization; the composition in each case was rubber 90 parts, sulphur 10 parts, and aldehyde-ammonia 1 part. In order to ensure as closely comparable composition and conditions as possible, the sulphur in both cases was first mixed with an equal weight of the rubber and the composition of each stock checked before introducing the correct amount of each into the final mixtures. Similarly the aldehyde-ammonia was first mixed with nine times its weight of the rubber so as to increase the accuracy with which equal proportions of this "stock" could be introduced into the two batches of equally "worked" rubber. Vulcanization was effected, with the two mixtures simultaneously, at 98 degrees, 108 degrees, and 118 degrees C.

It will be noted that under the conditions of these experiments the vulcanizing effect of $S\mu$, particularly at the lowest temperature, is definitely inferior to that of $S\lambda$.

Taking an extensibility of 700 per cent as a standard for comparison, the difference in the rate of vulcanization of the two mixtures is clearly seen from the respective periods required, and the more rapid conversion of $S\mu$ into $S\lambda$ with rise of temperature is reflected in the corresponding decrease in the temperature coefficient.[2]

	Rate of vulcanization				
	$S\mu$ (93%)		$S\lambda$		
Degrees C	Time required	Temp. coefft.	Time required	Temp. coefft.	Relative effect. $S\mu$:$S\lambda$.
98	32 hours	—	23 hours	—	1:1.4
108	550 mins.	3.5	440 mins.	3.1	1:1.3
118	185 mins.	3.0	140 mins.	3.1	1:1.3

An experiment with similar mixings of the same rubber and two forms of sulphur in the same proportions, but without the catalyst and at 148 degrees, confirmed the earlier observations as to the closely comparable effectiveness of the $S\mu$ and $S\lambda$ at this temperature, the relative effectiveness calculated in the same way as above being 1:1.06.

These results as a whole demonstrate that at the ordinary vulcanizing temperatures, e. g., 148 degrees, $S\mu$ changes so rapidly into $S\lambda$ that no appreciable difference can be detected in the rate of vulcanization, the effect in each case being that actually produced by $S\lambda$. At lower temperatures it is possible to detect a distinctly feebler effect in the mixture containing $S\mu$. The possibility that this difference may be characteristic not of $S\mu$ but of $S\pi$, which is formed together with $S\lambda$ from the less stable $S\mu$ at such temperatures, is hardly in accord with the almost identical effect observed at 148 degrees C. (see above) and with the results given below. In all likelihood therefore the difference arises from the $S\mu$ itself and is probably not explained completely by the lower solubility of this form of sulphur.

From the constancy of the temperature co-efficient of the reaction between ordinary sulphur and rubber at 138 degrees—168 degrees C., over which range $S\lambda$ gives rise to an increasing proportion of $S\pi$, it would appear that $S\pi$ and $S\lambda$ are of almost equal activity in this direction.

There appeared to be some hope of obtaining more evidence of the activity of $S\mu$ relative to $S\lambda$ by making vulcanization experiments with rubber at higher temperatures, at which sulphur is known to undergo a marked change in molecular complexity probably corresponding with a rapidly increasing proportion of $S\mu$ in the equilibrium mixture. Unfortunately with ordinary rubber the chemical change accompanying vulcanization would then be too rapid for convenient examination, and recourse was therefore had to the use of synthetic rubber which, as is well known, is relatively sluggish in vulcanization; the sample used was of "methyl-rubber," i. e., polymerized dimethylbutadiene, which was free from artificial catalysts and "elasticators." On account of the hardness of the vulcanized products obtained with such synthetic rubber, no physical tests were possible and the rate of re-

[1] Journal of the Society of Chemical Industry, February 28, 1921.

[2] In these experiments vulcanization was effected uninterruptedly for the full periods, the temperature of the oil bath being maintained constant for the whole of the time. The greater value of the temperature coefficient obtained previously with $S\lambda$ for the interval 98 degrees-108 degrees C. is to be ascribed to the fact that the earlier experiment at 98 degrees C. was made in two stages, with the result that the vulcanization would be retarded somewhat on account of the partial separation of sulphur from solution in the rubber halfway through the experiment.

action was followed only by the gradual disappearance of sulphur into combination. The composition of the original mixture was sulphur ($S\lambda$) 10.4 per cent, methyl-rubber 89.6 per cent. Experiments were made at 168 degrees, 178 degrees, and 188 degrees C.

It is remarkable that the disappearance of most of the sulphur into combination appears to follow the approximately rectilinear course already observed with natural rubber. If, as suggested by van Iterson, this is due to autocatalysis it is evident that the non-caoutchouc constituents of natural rubber are not responsible.

The results are not quite as smooth as could be desired, but if comparison is made of the time required for the attainment of the various degrees of vulcanization at different temperatures, the temperature coefficients in each case are greater for the interval 168 degrees—178 degrees than for 178 degrees—188 degrees.

The apparent slight increase in the temperature appears to indicate the existence of a very brief initial period of greater reactivity. This may be due to the fact that the sulphur initially is composed practically entirely of $S\lambda$, which rapidly undergoes conversion into the less active equilibrium mixture; it might, however, be caused by the presence in the synthetic rubber of a small proportion of some more active material. There is no such regular alteration observable in the figures calculated in a similar way from the experiments with ordinary rubber and sulphur at 138 degrees—168 degrees C.

A better comparison of the temperature coefficients is probably given by the ratio of the tangents of the angles included between the horizontal axis and the line between the origin and the point representing the end of the "rectilinear" course of the vulcanization process. This method of comparison likewise shows a smaller increase in the rate of reaction for the second interval.

	Time (minutes)			Temperature coefficient	
Vulcanizing coefficient	168°	178°	188°	178°-168°	188°-178°
4	25	14	—	1.8	—
5	34	18	10	1.9	1.8
6	43	21	11	2.0	1.9
7	52	24	12	2.2	2.0
8	61	28	14	2.2	2.0
9	73	31	15	2.4	2.1
angle	33°	56°	71°	—	—
tan. angle.....	0.65	1.48	2.90	2.3	2.0

The smaller coefficient for the higher temperature interval suggests that the sulphur equilibrium mixture at the higher temperature is relatively less effective than the equilibrium mixture existent at the lower temperature; as the difference in the composition of the two equilibrium mixtures will be a smaller proportion of $S\lambda$ and a greater proportion of $S\pi$ and $S\mu$ at the higher temperature, and as the earlier considerations lead to the view that the effectiveness of $S\pi$ is very little different from that of $S\lambda$, it follows that the results again indicate a somewhat inferior vulcanizing capacity for $S\mu$. It must be remembered, however, that the observed differences in such experiments, based on the relative activity of interchangeable modifications of a chemical substance, will be diminished by the tendency of the equilibrium automatically to adjust itself as the more active form disappears.

Although these results indicate a difference between the activity of $S\mu$ and of $S\lambda$ or $S\pi$ the outstanding fact is not the existence of this difference but its relatively small magnitude. The three forms are of such diverse general characteristics that much greater differences might have been expected. Under the conditions of ordinary technical practice indeed, the possibility of alteration in the relative proportions of the various modifications of sulphur is not likely to form an appreciable disturbing factor in vulcanization, and the only instance of any special form of sulphur (as such) showing special vulcanization features appears to be that possibly involved in the recently discovered method of treating raw rubber with sulphur dioxide and hydrogen sulphide.

METHODS OF ANALYSIS

DETERMINATION OF ANTIMONY IN RUBBER GOODS

THE METHOD for determining antimony in rubber goods as given by S. Collier, M. Levin, and J. A. Scherrer[1], follows: The sample (0.5-gram) is extracted with acetone and, if mineral oil or "substitute" is present, further with chloroform until the extract is no longer colored; after drying in a vacuum, the material is heated with 25 cc. cymene at 130 degrees — 140 degrees C. in a 300 cc. flask until the rubber has completely dissolved; the cooled liquid is diluted with 250 cc. of light petroleum spirit (maximum boiling point 45 degrees C.) and the mixture left overnight, being then decanted through a Gooch crucible. After washing ten times with petroleum spirit the residue is dried and shaken with 30 cc. hydrochloric acid, until the antimony sulphide has passed into solution. The solution is filtered slowly through the dried Gooch crucible and after dilution, the antimony is precipitated with hydrogen sulphide. The antimony is then estimated, e. g., by heating with 12 to 15 cc. sulphuric acid and 5 grams potassium sulphate in a Kjeldahl flask until a colorless solution is obtained, diluting to about 100 cc. with water, adding 20 cc. hydrochloric acid and 1 to 2 grams sodium sulphite, boiling to expel all sulphur dioxide, and titrating with tenth normal permanganate.

DETERMINATION OF TOTAL SULPHUR IN RUBBER

The following methods for rubber analysis are given by A. R. Pearson in *Analyst*, 1920, 45, 405-409.

Twenty cc. of nitric acid (sp. gr. 1.5) is placed in a flask and 0.5-gram of the rubber is added in small pieces at a time; the mixture is heated gradually and kept on a water-bath for 30 minutes. Small successive quantities of permanganate are added until some manganese oxide remains unreduced after one hour's heating, 20 cc. of concentrated hydrochloric acid is added, the mixture again heated, evaporated to dryness, the residue treated with hydrochloric acid, again evaporated, the residue treated with hot dilute hydrochloric acid, the solution filtered, and the sulphuric acid in the filtrate determined gravimetrically.

DETERMINATION OF CARBONATES IN RUBBER MIXINGS

One gram of the finely divided sample is heated with 25 cc. of glacial acetic acid in a flask provided with a short reflux condenser, the latter being connected with a U-tube containing solid lead acetate, a U-tube containing in one limb sodium acetate and in the other calcium chloride, and two weighed tubes containing soda-lime and calcium chloride. The contents of the first two U-tubes must be saturated with carbon dioxide before use. A current of air is aspirated through the apparatus during the whole operation.

[1]The India-Rubber Journal, 1920, 60, 1297-1298.

CHEMICAL PATENTS

THE UNITED STATES

RUBBER MIX AND PROCESS OF COMPOUNDING RUBBER, CONSISTING in adding to rubber, water carrying in suspension hydroxide of aluminum, mixing the water and aluminum hydroxide with the rubber, driving off the water, and heating the mix with a vulcanizing agent to effect vulcanization.—Robert C. Hartong, assignor to The Goodyear Tire & Rubber Co., both of Akron, Ohio. United States patent No. 1,370,965.

HEAT-INSULATING MATERIAL AND METHOD OF MAKING IT. Heat insulating material capable of maintaining its rigidity, at ordinary temperatures of artificial refrigeration the material being cellular and of approximately the following composition: asphaltum 27.0; infusorial earth 11.0; magnesium carbonate 5.0; crude rubber 26.9; sulphur 14.9; sulphur treated corn oil 2.6; petroleum tailings 5.8; bicarbonate of soda 6.0; alum 0.8.—Clark H. Bennett, Chicago, Illinois, John F. Palmer, St. Joseph, Michigan, and Frank V. Wedlock, Chicago, Illinois, assignors to Bentex Co., Chicago, Illinois. United States patent No. 1,371,016.

ART OF VULCANIZING CAOUTCHOUC WHICH CONSISTS IN BRINGING together under reacting conditions sulphur and a nitrogen accelerator to produce a sulphur-nitrogen accelerator, and subsequently incorporating the sulphur-nitrogen accelerator in the caoutchouc mix and vulcanizing it.—Clayton W. Bedford, assignor to The Goodyear Tire & Rubber Co., both of Akron, Ohio. United States patent No. 1,371,662.

ART OF VULCANIZING CAOUTCHOUC WHICH CONSISTS IN BRINGing together under reacting conditions sulphur and a nitroso derivative of an aromatic amin to form a sulphur-nitrogen accelerator, incorporating the sulphur-nitrogen accelerator in the caoutchouc mix and vulcanizing it.—Clayton W. Bedford, assignor to The Goodyear Tire & Rubber Co., both of Akron, Ohio. United States patent No. 1,371,663.

ART OF VULCANIZING CAOUTCHOUC SUBSTANCES, WHICH CONsists in bringing together under reacting conditions sulphur and a methylene group-containing Schiff base to form a sulphur-nitrogen accelerator, incorporating the sulphur-nitrogen accelerator in the caoutchouc mix and vulcanizing the same.—Clayton W. Bedford, assignor to The Goodyear Tire & Rubber Co., both of Akron, Ohio. United States patent No. 1,371,664.

PROCESS OF COMPOUNDING LUBRICATED SULPHUR AND RUBBER and vulcanizing, which consists in first mixing together the rubber and other ingredients of the compound, with the exception of the vulcanizing agent, then adding and mixing sulphur which has been treated with a lubricant, and vulcanizing the resultant mixture.—Daniel Repony, assignor to The Manhattan Rubber Manufacturing Co., both of Passaic, New Jersey. United States patent No. 1,372,041.

MOLDED ARTICLE AND METHOD OF MAKING IT WHICH CONSISTS in heating tung oil to a relatively high temperature while avoiding its solidification, molding a mixture comprising the treated oil compounded with a suitable filling material, baking the molded article, and applying thereto an external insoluble coating.—Leo H. Baekeland, Yonkers, New York, assignor to General Bakelite Co., New York, N. Y. United States patent No. 1,372,114.

THE DOMINION OF CANADA

LEATHER PRESERVING COMPOSITION COMPRISING A VARNISH having copal gum 96 parts, colophony 11 parts, linseed oil 200 parts, turpentine 320 parts, camphor 4 parts, proxyline 9 parts, acetone 32 parts, Pará rubber 3 parts, benzol 16 parts and benzine 6 parts.—Joseph Raoul Montpetit and James Scott Adamson, both of Ottawa, Ontario. Canadian patent No. 208,911.

PUNCTURE PROOF COMPOSITION FOR PNEUMATIC TIRES COMPRISING a combination of flakes of flexible material and a paste of finely ground or precipitated clay, china clay, silica, chalk, French chalk, or alumina, which will not affect or injure the rubber.—William Malem Brothers, Ruddington, Nottinghamshire, England. Canadian patent No. 209,182.

PROCESS OF VULCANIZATION CONSISTING IN INTIMATELY MIXING crude rubber with a vulcanizing agent comprising barium thiosulphate and heating the mixture to produce a vulcanized compound combined with inert and stable filling material.—Edgar Levinstein, Boston, Massachusetts, U. S. A. Canadian patent No. 209,239.

WRAPPING MATERIAL FOR PROTECTION OF CRUDE RUBBER. A separable protective covering for wrapping crude rubber for shipment consisting of a sheet of relatively tough, pliable, air impervious, chemically parchmentized vegetable fiber.—The Diamond State Fibre Co., Bridgeport, Pennsylvania. Canadian patent No. 209,322.

SOLUTION FOR USE IN MANUFACTURE OF BOOTS AND SHOES. An adhesive solution consisting of about 15 ounces of Venezuelan balata, about 20 ounces of tumaca block balata and about 15 ounces of solvent naphtha.—George Emanuel Haldinstein, assignee of Frederick Lu, both of Norwich, Norfolk, England. Canadian patent No. 209,580.

OTHER CHEMICAL PATENTS

THE UNITED KINGDOM

NO. 156,116 Diolefines and their polymerization products prepared by heating molecular proportions of an ethelene hydrocarbon and an acetylene hydrocarbon under pressure.

156,117 Vinyl halides and esters and their polymerization products prepared by heating acetylene hydrocarbons with halogen hydrides or with methyl halides under pressure.

156,118 Rubber compositions, synthetic rubber and vulcanizing rubber are prepared by condensing an alkyl- or aryl-amine with acrolein.

156,119 Synthetic rubber diolefine hydrocarbons converted into rubber-like substances.

156,120 Vinyl halides produced by heating calcium carbide with hydrogen halides dissolved in water or an organic solvent in the presence of a catalysist.

156,121 Preparation of vinyl compounds useful for the manufacture of varnishes, artificial resins and synthetic rubber substitutes.

156,122 Diolefines and their halogen derivatives. Production and utilization for rubber synthesis.

156,137 Plastic compositions. A resinous body, prepared by condensation of a ketone and an aldehyde and treatment with an alkali.

156,143 India rubber substitutes from a fatty acid and fish oil or other vulcanizable oil by treatment with sulphur dichloride.

156,144 Rubber substitutes made from fish oil, oleic acid and sulphur.

156,149 Coating composition in the form of suspensoid colloidal solution of rubber in benzol with or without addition of accelerating agents.

156,150 Reclaiming waste rubber. Waste rubber free from fibrous matter is highly dispersed by treatment in a colloid mill with water, or benzene or petroleum accelerated by addition of soaps or glue, etc. The sulphur is dissolved and removed by filtration.

All the above patents (not yet accepted) are in the names of H. Plauson, 14, Huxter, Hamburg, Germany, and J. A. Vielle, 17 Waterloo Place, Pall Mall, Westminster, London.

156,542 Puncture sealing composition comprising ground mica and cork mixed with water. F. A. McCarty, 31 Queen Street, Melbourne, Australia. Not yet accepted.

LABORATORY APPARATUS

FLEXIBLE ARM FOR LIGHTING

LOCALIZED LIGHTING is frequently desirable in laboratory and testing work as well as for many industrial operations. The illustration shows a flexible arm lighting unit which can be used with any system of wiring, either open or conduit. The support for the arm is a 30-inch length of ¾-inch conduit, firmly attached by cleats to wall, ceiling or floor. The joint between this conduit length and the rigid section of the arm is a ball-and-socket box which makes a strong self-adjusting joint. The rigid portion of the arm is a half-inch conduit of any length desired, to which is clamped a length of flexible conduit terminating in a lamp socket connection. This arrangement permits the light to be located exactly and securely where desired.—Sampson Axcess System, Inc., 434 Union street, Lynn, Massachusetts.

ADJUSTABLE LIGHTING UNIT

PREVENTING VIBRATION OF BALANCES

The following means, according to Walter C. Durfee in a recent issue of *The Analyst*, are effective for protecting fine chemical balances from vibrations.

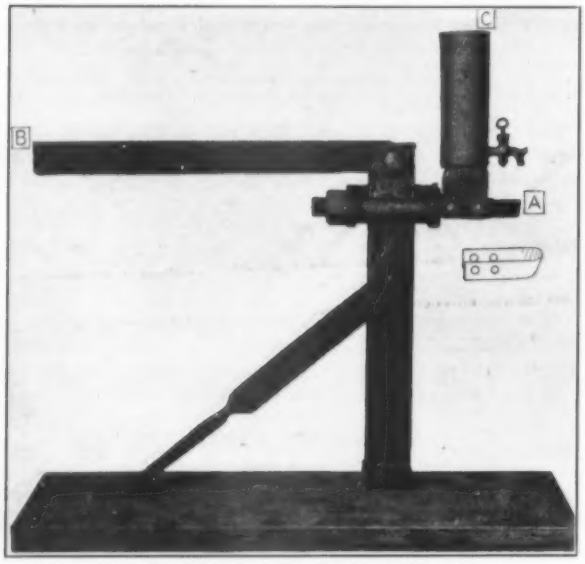
The balances are placed on a heavy slab which is supported by three balls of solid rubber resting on a strong table top. The balls are about 1½ inches in diameter and under the weight become flattened sufficiently to prevent any tendency to roll. In the beginning the balls should be fastened in some way, as for example by a short nail from underneath, by saucers or by a packing of cotton between the table and slab.

"MICRONEX"

"Micronex" is the copyrighted trade mark name of specially prepared carbon or gas black for use in rubber compounding. The name is symbolical of its extremely minute particle size. It is chemically inert and has physical activity in retarding oxidation.

MACHINES FOR RETREADING AND REGROOVING SOLID TIRES

REPAIRERS AND USERS mourn because the solid tire does not lead itself to repair as does the pneumatic. In other words, retreading—that is, attaching a new tread, slipping in new sections and all ordinary air-tire repairs, are not done. Nevertheless, the big tires are retreaded, but by cutting away the worn

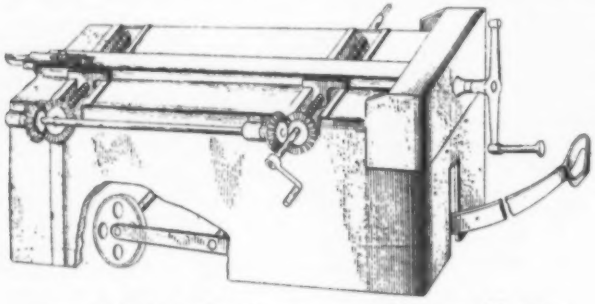


FIRESTONE SOLID-TIRE GROOVING MACHINE

outer surface and getting down to a new unworn one. So also the double or treble grooved tire, if worn down or ground down, must be regrooved.

For this purpose, several machines are employed. What is known as the Firestone machine is shown in the accompanying illustration. This employs a V-shaped knife *A* which is forced against the tire by means of a lever *B* swinging on a bolt in a steel standard fastened to a wood base. A can *C* bolted above the knife allows water to drip on the blade to facilitate cutting the rubber. While forcing the knife against the tire, the operator steadies the machine by standing on the wood base. This very simple and compact tool has been in effective use in many solid tire applying stations.

Another machine for trimming and grooving worn solid truck tires has a wooden base, reenforced with angle iron to prevent



BOUCHER'S SOLID-TIRE TRIMMING AND GROOVING MACHINE

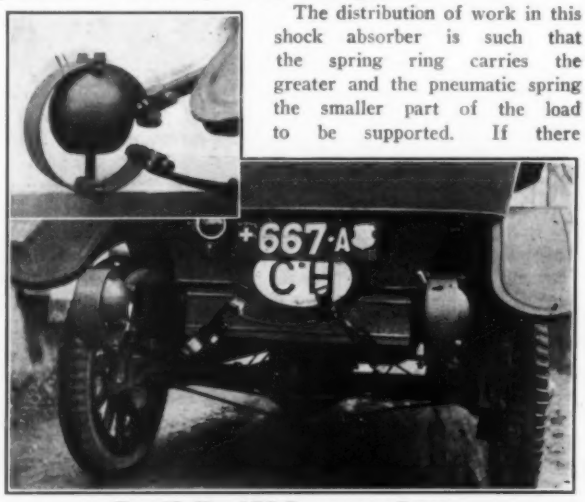
vibration, and is movable on steel wheels controlled by a handle. The knife on the machine is so designed that its tendency is to sharpen itself rather than to get dull with use. Four tires can be trimmed with it in fifteen minutes. The motive power of the truck is used for turning the rear wheels when the latter are presented to the trimming machine, but the front wheels are turned by hand. When the machine is set against a solid tire and the latter is revolved the turning of the crank at the side causes the carriage holding the knife to travel transversely on the tire, cutting its surface perfectly flat. The motion is reversed with a crank on the opposite side. The depth of a groove can be determined and then made by first setting the carriage and turning the crank at the end of the machine, the crank being connected with an adjusting screw at the end of which is the knife. The machine weighs 100 pounds.

It is claimed that with this device, the life of many solid tires, ready to be discarded because badly cupped and flattened, can be greatly prolonged and a service offered solid tire owners that has often been unobtainable.—Atkin & Boucher, 8414 South Figueroa street, Los Angeles, California.

A NEW SHOCK ABSORBER

The wide use of automobiles for pleasure touring has created a great demand for shock absorbers to smooth out the roughness of country highways. Metal shock absorbers or combinations of metal and liquid, have been found of little use in improving the spring action of the car as a whole. Air shock absorbers have usually been somewhat impractical because of voluminous receptacles and high air-pressure.

The newest shock absorber "J. H.—AR" (a-r or air) combines the metal with the pneumatic spring in such manner as to take away from each kind of spring its disadvantages and to produce an auxiliary spring with no after-vibration, as it possesses the power of checking its own oscillations. The construction includes a ring made of spring band steel which is inserted between the existing laminated spring and the frame of the chassis in place of the shackles. This ring supports an air spring consisting of a cylinder ball containing a rubber air cushion and a piston working against it. The cylinder is clamped to the upper part of the ring and the piston to the lower by means of flanges.



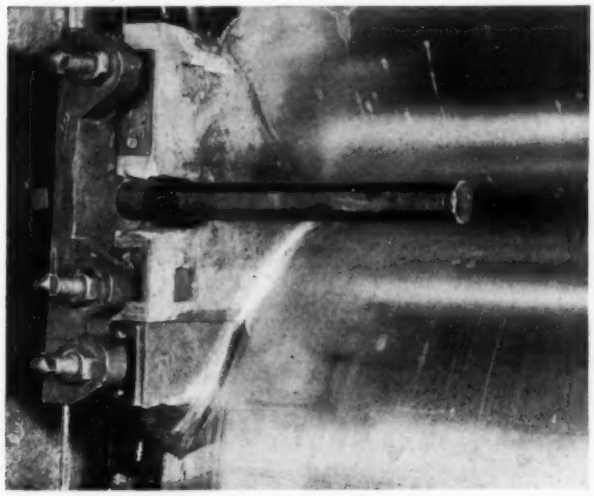
THE "J. H.—AR" PNEUMATIC SPRING

The distribution of work in this shock absorber is such that the spring ring carries the greater and the pneumatic spring the smaller part of the load to be supported. If there is no air in the rubber air cushion the ring will be nearly closed. By pumping air into the rubber air spring the upper part of the auto body is lifted into its normal position, which balances the car. By increasing the air pressure according to the weight to be carried the metal spring can always be kept in its open position and it is thus possible to give the shock absorber its original resistance. There are no frictional parts, therefore the absorber does not require lubricating bolts or grease cups. The simple action of the piston compressing the air in the rubber cylinder ball absorbs all shocks. —W. A. Wetterwald Co., 160 Fifth avenue, New York, N. Y.

New Machines and Appliances

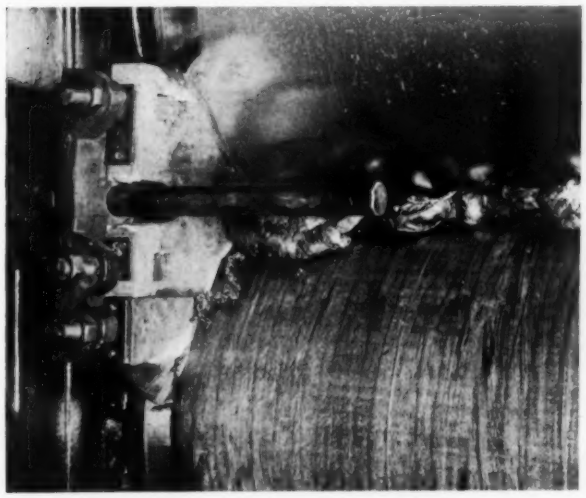
THE PERFECTED CALENDER GUIDE

IN CALENDERING RUBBER, considerable annoyance and waste of rubber is caused by the rubber on the roll working under the guide and depositing on the roll bearings where it interferes with lubrication, and becoming impregnated with oil and dust, is a source of trouble to both calender operators and repair men.



CALENDER GUIDE IN POSITION

The usual type of guide consists of a cast-iron holder fitted with a deflector made entirely of wood which is difficult to keep fitted close enough to the roll to prevent the rubber from working under it. Practically all guide trouble is experienced at the first



CALENDER GUIDE IN OPERATION

point of contact between rubber on the roll and the guide, or, at what might be termed the "heel" of the guide.

The perfected patent guide shown in the illustration, is composed of three parts, the cast-iron holder, the bronze heel and the wood or metal filler. The holder is practically a duplicate of the common guide holder, extended and arranged to carry the bronze heel which does all the work. It is fitted accurately to the roll when first assembled, and is kept in place against the roll by adjusting the set-screw in the guide holder. The wood or metal part of the guide once in place and fitted to the rolls requires no adjusting, as all the wear is taken by the bronze heel, which is separate from although alined with the wood filler. The wood or metal filler will not damage the roll, as no pressure is required, because it only guides the rubber which has been deflected by the bronze heel. The excessive pressure necessary on the old type guide is entirely eliminated, for the slight pressure on the bronze heel is insignificant, as the arc of contact is about one-fifth of what was necessary with the old style guide.—Farrel Foundry & Machine Co., Ansonia, Connecticut.

A NEW TIRE SPREADER

An aid to the garage man is the tire spreader shown herewith. It is attached to the wall or a post capable of sustaining a weight of 150 pounds and the weight of the casing. All the sliding rods and working parts are of chrome-nickel steel. The heavier castings are of gray iron. Careful machining and accurate lathe work insure continuous operation with freedom of repairs.

THE KEHAWKE SPREADER

The machine is set for a smaller casing than that which is to be spread. This is done by turning the large wheel in the center. A hidden spring holds all the hooks open and out of the way until a slight pressure returns them to place. The casing is lifted from the floor and suspended from the two top inside hooks. The bottom set of hooks is closed and the whole machine is turned slowly, closing each hook as it comes to the bottom. The larger of the two wheels in the center is turned to the right. This fits the hooks to the diameter of the casing. By turning the small hand-wheel to the right the tire is spread open. The action is easy and the time required is less than twenty seconds. There is no flattening of the tread and the spreading takes place where it should—in the side-walls close to the beads, thus facilitating the workman in placing the reliner, removing a frozen tube, or buffing the inside or outside of the casing.—KeHawKe Manufacturing Co., Minneapolis, Minnesota.

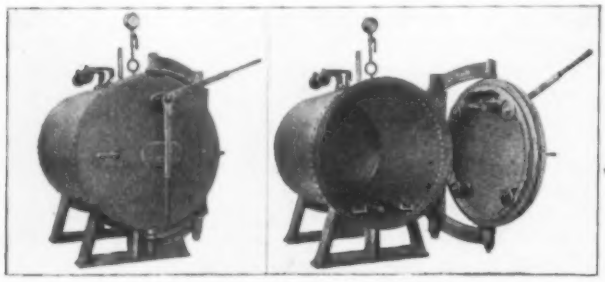
A QUICK-LOCKING VULCANIZER DOOR

A quick-locking door for vulcanizers, distinct in design from the types that depend on the action of wedges, broken screws or the bayonet lock principle, is here shown.

Both shell and door are provided with inward flanges. A circular steel spring, the most essential element of the device, is mounted in the door. This spring has a groove in which an elastic packing ring is fitted. When closed, a groove in this

circular spring fits over both of the flanges so that the axial strains between door and shell are supported.

For the operation of the mechanism of the door, a double lever is provided. The circular spring is guided and supported by four flanged rollers fixed to the inner surface of the door. The

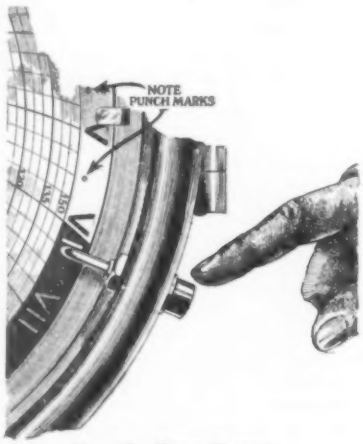


THE ENSINK VULCANIZER HEAD

spring ring is not a full circle, but is open at the top, bridged by a steel spring which presses the packing tightly against the flanges. In the center of the door is a small cock for testing the internal pressure and safeguarding the operation of the unlocking lever while pressure is on. The design of the hinge makes it possible to turn the door away from the front of the vulcanizer, affording ready access.—The Ensink-Hilversum Engineering Works, Holland. Hugh Griffiths, sole representative, 15 New Bridge street, London, E. C. 4.

TIME PUNCH FOR RECORDING THERMOMETER

A notable improvement in recording thermometers consists of a simple time-punch device attached to the well-known Columbia recording thermometer, making it a two-in-one instrument that does double duty. Every fluctuation in temperature is recorded, but the record shows whether the operator in charge has been watching these fluctuations as he should.



S. & B. TIME PUNCH

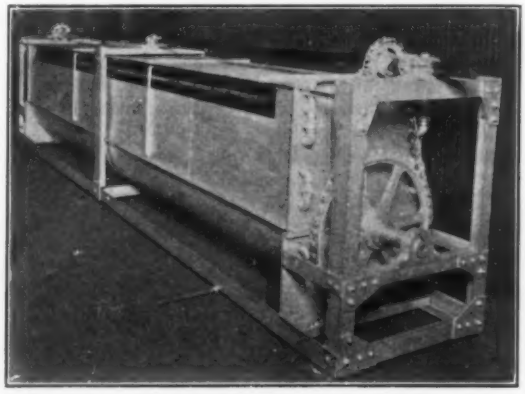
The chief function of the time punch is to prevent negligence and to promote vigilance by checking the inspection of the record made by the operator, who records his inspection by pressing the button shown in the illustration. This effects a punch mark on the chart of the instrument recording the time of observation and regulation of the temperature conditions.—The Schaeffer & Budenburg Manufacturing Co., Brooklyn, New York.

DRIER FOR COMPOUNDING INGREDIENTS

The drier shown in the illustration can be used as a "batch" or a continuous flow drier for powdered compounding ingredients.

The drier itself is stationary and flights are used to keep the material thoroughly agitated, bringing it up and dropping it on the inside core or heating chamber. As the material drops a strong circulation of air passes through it, which removes the moisture and vapors.

The apparatus, when steam-operated, requires not exceeding five horse-power. Where excessive heat is required a perfected oil-heater attachment is used, circulating oil in place of steam, and by this means an average temperature of 500 degrees F. can



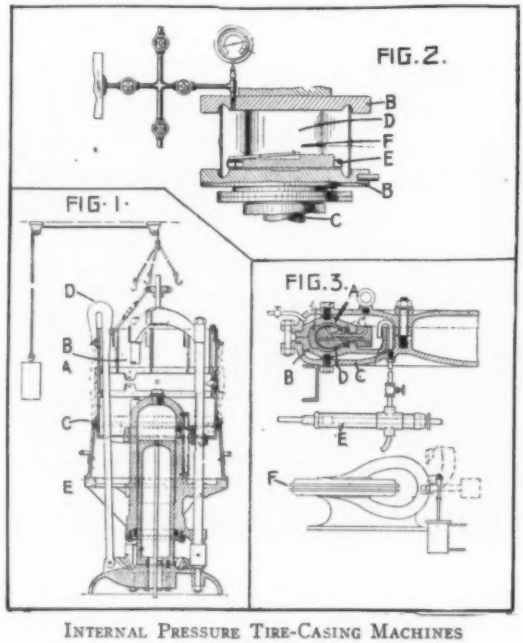
THE LEWIS DRIER

be obtained. This method is the most easily controlled source of heat known.—The Lewis Drier Co., New York Life Building, Kansas City, Missouri.

MACHINERY PATENTS

TIRE-SHAPING MACHINE

A SHAPED TIRE CASING is produced from a flat band through the use of an apparatus illustrated by Fig. 1. In operation, one edge of the band is held against a fixed abutment towards which the other edge is pressed, while the mid-portion of the band is forced radially outwards. The band *A* is fited over a drum formed by three rings, between stop rings *B, C*. The upper ring is held stationary by the hooked ends of arms *D*, which are pivoted to the base and also adjustably linked to a movable head. The lower ring *C* is carried on a drum which is fitted on a flange



INTERNAL PRESSURE TIRE-CASING MACHINES

E of a cylindrical plunger raised by hydraulic pressure. The plunger is fitted with racks which, through pinions engaging the fixed racks, transmit a slower movement to a spider supporting the lower drum ring. An inflatable tube mounted on the middle

drum-ring is used to distend the band *A*. Owing to the differential movements of the cylinder and the spider, the expanding pressure is applied throughout at the center of the band. At the end of the upward travel, split rings snap into grooves in the middle drum-ring, which is removed with the shaped casing and tube for the finishing operations. The plunger is lowered, the arms *D* are swung centrally inwards to clear the drum structure, which is then removed by the tackle. The machine is adapted for shaping tire casings of various sizes by the substitution of graded rings and drums.—E. Hopkinson, New York, N. Y., and H. V. Lough, Hartford, Connecticut, U. S. A. British patent No. 149,577.

MACHINE FOR MAKING TIRES

This apparatus shown in Fig. 2 consists of a series of plates, connected to a ram, with necessary air reservoir, valves, gages, and a mechanically expanded ring. In operation, a partially vulcanized flat-sectioned tire cover is expanded to the form of an ordinary tire cover by the direct action of pressure. It is retained in its expanded condition for vulcanizing purposes by a mechanically expanded internal ring. The tire cover is placed between the plates *B*. The ram *C*, automatically operated, advances the lower plate towards the upper. Air admitted to the chamber *D* from the reservoir or compression tank, expands the tire cover. The center part is forced outwards to give the desired shape. During this process, the expansion ring *E* is held in its contracted form by a pin and the lever *F*. When the free end of the lever comes in contact with the upper plate, the ring is released. It then expands under the action of internal springs until it fills the space within the expanded tire cover. After the air has been allowed to escape, the plates are separated. The tire cover is removed in its expanded form on the ring and vulcanized. A fluid-tight joint between the tire cover and the plates is made for beaded tires by means of a separate ring and a packing ring, or, for wired-on tires, by means of an L-section packing ring.—T. Sloper, Southgate, Devizes, Wiltshire, England. British patent No. 150,792.

MOLDING AND VULCANIZING TIRES

This machine relates to the method of manufacturing rubber tires by the internal-pressure system. Referring to Fig. 3, the mold shells *A* and *B* for the tire casing are mounted inside of, or form part of the containers *C*. These containers are constructed to provide the necessary space for the pressure. Such spaces form a continuous passageway for the pressure from the supply pipe, which is supplied as soon as the mold is closed. The shells *A* are mounted in the containers *C* by screws. The containers are held together by bolts and provide a pressure tight space. Pressure enters by way of a channel formed between an upstanding flange and the inner surface of the core *D*. A vent in the core allows the air to escape from the inside of the tire casing. The heating spaces around the mold may have a separate supply of heating fluid. In order to heat up quickly a reserve of hot fluid is provided in a steam heated vessel *E*.

The containers *C* are preferably horizontal, as shown at *F*, the lower one being fixed in a permanent position while the upper half is hinged to it and operated by a hydraulic cylinder with balance weight. When arranged in rows, the molds are served by an overhead carrier. While one group is being emptied another may be closed with casings under treatment. The cores may be solid, collapsible, or in the form of an inflatable tube.—Dunlop Rubber Co., Westminster, London, and C. Macbeth, Birmingham, England. British patent No. 150,373.

OTHER MACHINERY PATENTS

THE UNITED STATES

NO. 1,369,826 Machine for manufacturing cord binding. F. J. MacDonald, assignor to the Firestone Tire & Rubber Co.—both of Akron, Ohio.

1,369,933 Rubber conveying and soapstoning apparatus. L. R. McGuire, assignor to the Firestone Tire & Rubber Co.—both of Akron, Ohio.

1,370,100 Tire band making machine. J. L. G. Dykes, Chicago, Ill., assignor to E. Hopkinson, New York, N. Y.

1,370,101 Tire band stretching machine. J. L. G. Dykes, Chicago, Ill., assignor to E. Hopkinson, New York, N. Y.

1,370,102 Tire band stretching and vulcanizing machine. J. L. G. Dykes, Chicago, Ill., assignor to E. Hopkinson, New York, N. Y.

1,370,268 Stock winding device for calenders. H. B. Batchelder, Springfield, assignor to The Fisk Rubber Co., Chicopee Falls—both in Mass.

1,370,287 Mold for cushion heels. M. C. Clark, Franklin, Mass.

1,370,398 Machine for treating rubber and other heavy plastic materials. F. H. Banbury, Ansonia, assignor to Birmingham Iron Foundry, Derby—both in Conn.

1,370,438 Repair vulcanizer. A. O. Harris, St. Louis, Mo.

1,370,597 Apparatus and method for making belts. H. M. Lambert, Portland, Ore.

1,370,911 Apparatus for covering tire beads. E. D. Putt, assignor to the Firestone Tire & Rubber Co.—both in Akron, Ohio.

1,371,046 Rubber masticator. C. C. Mosher, Lima, Ohio.

1,371,779 Tire repair mold for pneumatics. John Flynn, assignor to The Williams Foundry & Machine Co.—both of Akron, Ohio.

1,371,853 Plaiting machine. J. W. Brundage, assignor to The Miller Rubber Co.—both of Akron, Ohio.

1,371,914 Solvent recovery apparatus. W. K. Lewis and W. Green—both of Newton, Mass.

1,372,179 Repair outfit for rubber boots, rubber overshoes and like articles. F. C. McCollum and C. F. Everett, both of Jackson, Mich.

1,372,181 Apparatus for compressing carbon black and other pulverulent materials. W. W. McMahan, Detroit, Mich., assignor to Morgan & Wright, a corporation of Michigan.

1,372,190 Apparatus for compacting pulverulent material. C. J. Randall and R. R. Taylor, Naugatuck, Conn., assignors to the Goodyear Metallic Rubber Shoe Co., a corporation of Connecticut.

1,372,215 Mold for curing and forming blow-out patches. C. M. Anderson, Batavia, Ill.

1,372,545 Apparatus for pulling tire fabric plies or the like. J. A. Purvis and H. A. Sessions—both of Traverse City, Mich.

1,372,567 Method of manufacturing the covers of pneumatic tires. T. Sloper, Devizes, England.

1,372,660 Tire mounting device. J. Hoffer, Carlisle, Wash.

REISSUES

15,060 Machine for cleaning plastic materials. A. Suchy, Jr., Newark, N. J. Original No. 1,247,173, November 20, 1917.

THE DOMINION OF CANADA

208,953 Tire stand and buffing machine. C. L. Durham, Kansas City, Mo., U. S. A.

209,094 Trimming machine. The Goodyear Tire & Rubber Co. of Canada, Ltd., New Toronto, assignee of The Goodyear Tire & Rubber Co. of Canada, Ltd., Toronto, assignee of J. Clayton, Bowmanville, all in Ontario.

209,128 Tire rasping disk. The Smith One-Heat System, assignee of C. L. Smith and E. S. Webster, co-inventors—all of South Bend, Indiana, U. S. A.

209,129 Tire rasping wheel. The Smith One-Heat System, assignee of C. L. Smith and E. S. Webster, co-inventors—all of South Bend, Indiana, U. S. A.

209,131 Machine for making storage battery jars. Joseph Stokes Rubber Co., Trenton, N. J., assignee of T. A. Willard, Cleveland Heights, Ohio—both in U. S. A.

209,166 Apparatus for reclaiming rubber waste. F. L. Kryder and E. W. Snyder, co-inventors—both of Akron, Ohio, U. S. A.

209,196 Repair vulcanizer. J. H. Dougherty, Los Angeles, Calif., U. S. A.

209,328 Rubber mixer. The Farrel Foundry & Machine Co., assignee of D. R. Bowen, both of Ansonia, and C. F. Schnuck, New Haven—both in Connecticut, U. S. A.

209,736 Apparatus for producing rubber soles. The United Shoe Machinery Co. of Canada, Ltd., Maison-neuve, Quebec, Canada, assignee of G. Ferguson, Wollaston, Massachusetts, U. S. A.

GERMANY

DESIGN PATENTS ISSUED, WITH DATES OF ISSUE

767,018 (October 8, 1920). Brake for winding machine for making ring-shaped rubber goods like covers for pneumatic tires. Schmidts Gummiwarenfabrik A. Schmidt, Stade, i. Hann.

PROCESS PATENTS

THE UNITED STATES

NO. 1,370,339 Covering strands of cord fabric with rubber. T. Midgley, Hampden, assignor to The Fisk Rubber Co., Chicopee Falls—both in Mass.

1,370,800 Forming extruded fibrous articles containing partly cured phenolic condensation cementing material. H. C. Egerton, Ridgewood, N. J.

1,370,805 Manufacture of sponge rubber playing balls. C. F. Flemming, assignor to The Miller Rubber Co.—both of Akron, O.

1,371,804 Manufacture of artificial fur, comprising a fabric base, a coating of somewhat elastic vulcanizable material on the face side, having a large number of hairs stuck into it endwise, said coating being vulcanized to hold the ends of the hairs. H. T. Nowell, New Rochelle, N. Y.

THE DOMINION OF CANADA

208,966 Manufacture of cellular rubber and apparatus therefor. K. H. Fulton, Pittsburgh, Pa., U. S. A.

209,738 Forming foxing and applying to rubber footwear and apparatus therefor. The United Shoe Machinery Co. of Canada, Ltd, Maisonneuve, Que., assignee of L. A. Casgrain, Beverly, Mass., U. S. A.

THE UNITED KINGDOM

155,469 Finishing rubber-proofed fabrics to resemble silk, etc., by applying film or coating of mica while rubber is still adhesive. L. Minton, Trevelyan Buildings, Corporation street, Manchester.

New Goods and Specialties

DURABLE RUBBER APRON

THOSE INTERESTED in protecting clothing while moving about kitchen and kitchenette will be interested in a new and attractive household apron made of pretty percales, rubberized and vulcanized in white on the reverse side of the cloth. In outside appearance these aprons resemble the tailored percale ones not having the protection of the rubberized back. They are made in a large assortment of colors and patterns, and the manufacturer guarantees them not to crack if the directions given with each apron are followed closely. Sizes for women are 36 inches long by 24 inches wide, and for children 25 inches long by 18 inches wide.

THE "APRONEET"

Aprons are also made in a tan, durable base fabric rubberized on both sides, with a large pattern of double thickness at the wearing area, for both men and women for use in kitchen, shop, laboratory or school.—The Holley Company, Rochester, New York.

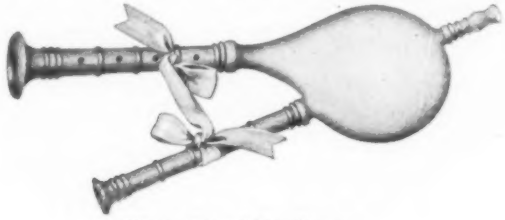
WEBBED SWIMMING GLOVE TO INDUCE CONFIDENCE

Of interest to swimmers and would-be swimmers is the "Duxfut" webbed glove for swimming. This glove is made in a two-piece mold, the back being flat and the inside conforming to the shape of the hand, the result being a webbed rubber glove with a flat back and a web between the thumb and each finger. The glove shapes to a fit about the wrist. Another style of glove is made of rubberized silk, consisting of a flat back and an inside one-piece cut-out for thumb and four fingers, being stitched or cemented upon the back. In the illustration the young woman is wearing the rubberized silk glove while the man, who is the inventor, has on the pure rubber one. The idea of these gloves is to give confidence to swimmers and beginners, capitalizing the tendency to forget and spread the fingers while swimming.—A. K. Zawadzki, Wrightstown, New Jersey.

"DUXFUT" RUBBER SWIMMING GLOVES

A RUBBER TOY BAGPIPE

For the younger boys who delight in the bagpipes as the Highlanders march by, the "Eagle Brand" bagpipe will hold a great fascination. It is substantially made and guaranteed against defects in workmanship. The bags are of the finest quality extra heavy weight rubber which insures a long period of service. The pipes are of selected maple, highly polished and shellacked, and their special and careful construction is such that their operation is simple and easy. The chanter has four notes while the drone pipe supplies one continuous sound as does the original Scotch bagpipe. A neat silk tassel attached to the chanter supports the drone pipe in proper position. Though having half the notes of the original bagpipe, the tones closely resemble those of the prototype.—The Eagle Rubber Co., Ashland, Ohio.



"EAGLE BRAND" TOY BAGPIPE

RIBBED CORD TIRE ADDED TO LINE

To make its line more nearly complete, the manufacturer of "Quaker" tires has added a ribbed cord tire with ebony-black tread, which is built oversize. The cross-section being much larger than that of fabric tires prescribes an oversize tube, also. The size of the tire provides more air space and a thicker tread, increasing the mileage, but at the same time insuring easier riding. "Quaker" tires have been tested under road conditions of all kinds, on different makes of cars, to demonstrate that they were properly constructed to withstand the varying road conditions a tire would encounter.

The company also manufactures a ribbed fabric tire, which has an ebony-black tread, besides the "T. T. T." non-skid fabric tire, the "T. T. T." non-skid cord described in our March issue, and "Quaker Multi-Tubes," made by the laminated process in which a number of layers of rubber are placed layer upon layer and integrally vulcanized.—Quaker City Rubber Co., Philadelphia, Pennsylvania.

"QUAKER" RIBBED CORD

"BRITE MAWNIN" JAR RINGS

One of the signs of spring and a hint to home canners to prepare for action is the rubber jar ring. Among the newest brands, recently trade marked, is "Brite Mawnin," which may be had in red, white, or gray.—Amboy Products Co., 35th and Morgan streets, Chicago, Illinois.

ATTRACTIVE, UNBREAKABLE, WASHABLE TOYS

Many manufacturers are earnestly endeavoring to meet the desires of the insatiable youngsters of today for novelty toys. "Ketson" toys made up in dolls and the most popular animals are charming additions to the playroom. These toys have for their foundation two rubber balls, the larger one for the body and the smaller one for the head. The balls, together with featherweight stuffing fill out the eiderdown

form of the animal. They are extremely light and as eiderdown is washable, are sanitary. The elephant's legs and

KITTEN BUNNIE PUPPIE BUNNIE ELEPHANT

trunk are packed in such a manner as to make him very sturdy on his feet, while the kitten, puppie and bunnie have an inside cardboard base upon which they sit firmly. Despite the two rubber balls, they do not bounce, being hampered by the base stiffening. The animals average about 6 inches in height, being very convenient for small children to handle.—The Ketcheson Supply Co., Springfield, Massachusetts.

AN IMPROVED SANITARY CAN SPOUT

Not only the housewife, but the "furnished-roomer" and bachelor who utilize condensed milk will be interested in the improved "Easy Serve" can spout. This has a spout approximately one inch in diameter which will permit any liquid, no matter how thick, to flow through. The double blades at the bottom cut a round hole, larger than a 25-cent piece, in the top of the can, folding the piece of tin inside so that it will not interfere with the flow of the liquid, or fall into the can. Projections on the side of the blades hold the spout in place with the rubber washer resting tightly against the top of the can. The removable cap on the top of the spout locks firmly in place with a slight turn. To pour liquid remove the cap.

"EASY SERVE" CAN SPOUT

This spout is sanitary, easily cleaned, and made of a non-corrosive and rust-proof material. Besides use on the milk can, it serves on boxes of cereals, soda, washing powder, etc. This device turns any can into a pitcher, protecting the contents from dust, flies and other foreign substances.—Baird-Daniels Co., Inc., 143 West Broadway, New York.

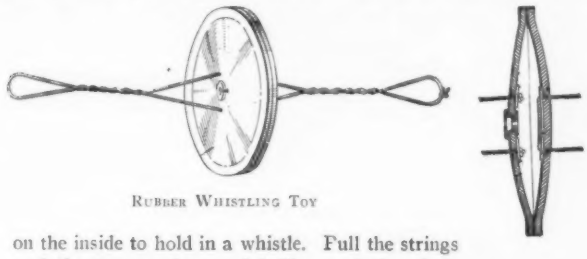
NEW CONSTRUCTION IN HEEL RUBBER INSERT

"Rotor" heels, which are on all "Ground Gripper" shoes sold outside of New England have lately been modified by moving the rubber plug or insert back from the outer forward corner of the heel and extending it back to the rear part of the heel. This new construction provides a yielding surface where it is most needed at the rear of the heel where contact with the ground first comes, lessening the wear of the heel at that point. It also avoids the liability of the catching of the rubber insert in ladies' skirts as sometimes happens with the rubber at the outside forward corner. The heel is constructed on low, broad and flat lines which make walking easier. The "Rotor" insert takes the jar off the heel, while the back part of the rubber insert is yielding and tends to balance the tread. The first suction cup in the middle of the insert has the effect of rotating the foot, while the second one provides the essential non-slipping feature. In front of this is the mechanical pivoting point.—E. W. Burt & Co., Inc., Boston, Massachusetts.

GROUND GRIPPER "ROTOR" HEEL WITH RUBBER INSERT

A WHISTLING RUBBER TWIRLER

The illustration shows a rubber toy consisting of two rubber disks fastened together at the circumference. Into one disk is inserted a string, the ends of which are tied together on the outside. Into the other disk are inserted both ends of a string, knotted



RUBBER WHISTLING TOY

on the inside to hold in a whistle. Pull the strings and the toy revolves and bellies, and the air is forced in through the whistle. Slacken the strings and the disks reverse their revolutions and the air is again forced through the whistle. Being made of rubber, this toy is harmless, and being inflated with air when in motion is an added attraction for children.—Jerry Rossi, Box 14, Times Plaza Station, Brooklyn, N. Y.

A SEVENTY-FIVE-MILES-TO-THE-GALLON AUTOMOBILE

One of the latest automotive novelties is the two-passenger automobile with a total weight under 150 pounds. This little car is claimed to have a maximum speed of 30 miles an hour; will travel 75 miles on a gallon of gasoline, and will be completely closed in for protection in all kinds of weather. The car is made almost entirely of aluminum-alloy and magnesium metal, has a 5 h.p. opposed motor and sliding gear transmission,

MARTIN "SCOOTAMOBILE"

and no universal joints or differential. It is amply strong to withstand all kinds of road shocks, and the wheel arrangements and spring construction make it ride as comfortably as a heavy and expensive car. The machine is narrow enough to be pushed through an ordinary doorway, and can be parked in the office or the front hall. The car is equipped with disk wheels and pneumatic tires.—Martin Rocking Fifth Wheel Co., Springfield, Massachusetts.

IT IS A GOOD RULE NOT TO CARRY A SPARE TOO LONG. Interchange it with the other tires every month. Of course it should be carried covered. When left out of service too long, its endurance and longevity are seriously handicapped.—*Miller News Service.*

RUBBER SHOPPING BAGS IN ENGLAND

Our English cousins have devised a practical means of shopping in stormy weather without harm to the dainty shopping bag of fair days. A rubber-covered "holdall" takes the place of the one of fabric or other material. These holdalls, called message bags, made in delicate shades of fawn, blue, saxe, heliotrope, or gray, besides black, are lined throughout, and drawn in at the neck with cords. Double strap handles are provided, after the English fashion, and the shape is called the "Dorothy." The sizes vary from 10 by 10½ inches to 13 by 15½, and the proportions also vary.—*Rubber Leaves*, Fowlers (Aberdeen) Limited, Imperial Place, Aberdeen, Scotland.

"DOROTHY" HOLDALL

LEATHER BASE RUBBER HEEL

One of the newest developments in solid rubber heels for repair work is that shown in the illustration. The special feature is a ply of heavy sole leather formed as a heel seat. This heel recommends itself to shoe manufacturers and repair men who cater to high-class trade. The leather base heel can be attached more quickly than a half heel and produces a very workmanlike job. In the case of a repair the old heel is removed entirely and the leather base heel substituted in one operation without the use of cement, requiring only to be trimmed and finished.—Panther Rubber Manufacturing Co., Stoughton, Massachusetts.

PANTHER LEATHER BASE HEEL

TIRE WITH RAISED TREAD—"HERRINGBONE"

A new "Globe" tire has recently been introduced that combines the sturdy wearing qualities of the former "Globe" tire with an attractive and long-wearing raised black tread, named from its distinctive pattern, the "Herringbone." This tough, rugged tread is made of a special compound heretofore used only on racing cars, and made to withstand racing conditions of excessive heat and unusual strain. The carcass is built of many plies of high-grade cord fabric and specially compounded rubber and the materials throughout are of the most lasting quality. The maker asserts a "Globe" carcass has never been known to wear out, and covers this statement with a satisfaction certificate.—Globe Rubber Tire Manufacturing Co., Trenton, New Jersey.

GLOBE "HERRINGBONE"

A BRITISH PUNCTURE-SEALING INNER TUBE

What promises to be a novel and simple method of overcoming puncture trouble is the use of mastic rubber in the "Challenger" puncture-sealing inner tube, a recent British invention. The tube is made of thick, soft, red rubber; the half corresponding to the tread is split and the cavity filled with mastic rubber, vulcanized in place, but soft and sticky enough to exude through the puncture and prevent the escape of air. "Challenger" puncture-sealing inner tubes are made in all sizes for cars and motorcycles. Their slight extra initial cost is more than compensated for by the long wear and the extra protection they afford the casings.—British patents, Nos. 22,450 and 30,720 of 1920. J. P. Cochrane & Co., Edinburgh, Scotland.

ENGLISH RUBBER HATS FOR OUTDOOR WEAR

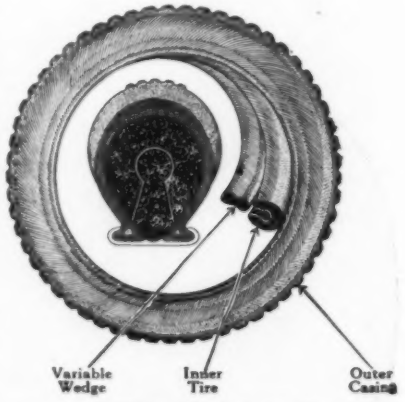
Our British cousins have solved the problem of looking chic and well-dressed, even in stormy weather, by evolving the rubber hat. Of the five styles shown here, the upper left-hand one is of plain colored rubber cloth, with interlined and stitched brim and band binding of bright black leather cloth with colored strips to match ground. The lower left-hand one has a striped leather cloth brim, with points turned back and finished with a button. The upper right-hand hat is similar, but the band and brim are of plain leather cloth. The finish is a bow and button in front. The lower right-hand design is of colored rubber cloth with band and brim binding of contrasting shade, and comes in assorted colors. The center hat on the model is of natural-colored rubber cloth with band and brim binding of bright black leather cloth. The soft brim is pliable enough to be pulled into the shape desired. This also comes in popular colors.—*Rubber Leaves*, Fowlers (Aberdeen) Limited, Imperial Place, Aberdeen, Scotland.

RUBBER HATS FROM THE BRITISH ISLES

"RUBBER ACE" INNER TIRE

A new development in anti-puncture substitutes for inner tubes is the "Rubber Ace" inner tire, United States patent No. 1,351,894. The device consists of molded rubber sponge in two sections as shown in the illustration. These are ring form although not endless, molded to fit one within the other, both together snugly fitting the interior of a tire casing. When in place they form an "inner tire" or resilient body compactly filling any casing whether of clincher or straight-side form.

The wedge-shaped ring occupies a central position and is of variable sizes. Its function is to spread out the filler ring so that any casing may be completely filled at a uniform pressure. The wedge ring fills the space between the beads of the casing and fits tightly against the center of the rim. The larger the wedge used the more the air cells are compressed and the greater the pressure in the tire.



NEW "RUBBER ACE" INNER TIRE

The countless air cells form a shock-absorbing cushion that rides more easily than the single air-inflated inner tube, insures absolute freedom from punctures, and lasts indefinitely.—Elgin Rubber Ace Co., Elgin, Illinois.

Annual Report of the United States Rubber Co.

THE TWENTY-NINTH ANNUAL REPORT of the United States Rubber Co., presented at the annual meeting, April 19, 1921, showed a new high record of sales and gratifying earnings for the calender year 1920. Net sales amounted to $256,150,130, compared with $225,589,465 for the preceding year. In 1913, the year before the war, net sales amounted to only $87,349,692. Net profits for 1920, after interest deductions, and provision for depreciation of plants and adequate reserves for Federal, Canadian and British taxes on income and profits, were $21,220,983, compared with $17,730,237 in 1919. From this there remained to be deducted $5,200,000 for dividends on preferred stock, including dividends payable January 31, 1921, $18,718 for dividends on minority stock of subsidiaries, leaving a surplus for the year of $16,002,265 applicable to the common stock, which was equivalent to $19.75 a share on the $81,000,000 of common stock outstanding, compared with $24.18 a share earned in 1919.

The annual report follows in full.

THE CHAIRMAN'S REPORT

To the Stockholders of the United States Rubber Co.:

Complying with the by-laws of the company, the chairman of the board of directors hereby submits to the stockholders the annual report for the fiscal year ended December 31, 1920.

On February 3, 1921, there was sent to the stockholders a preliminary statement of the operations of the company during the year 1920, and of the position of the company at the close of the year. This was done in order to give the stockholders as prompt information as possible as to the affairs of the company, owing to the unsettled business conditions then existing. The results reported in the preliminary statement were substantially the same as those shown herein.

The consolidated general balance sheet as of December 31, 1920, of the United States Rubber Co. and its subsidiaries, after eliminating all offsetting accounts between the companies, compiled by the comptroller and certified by public accountants, is appended hereto and made a part hereof.

VOLUME OF BUSINESS AND PROFITS

The net sales of the company for the year 1920 were $256,150,130, being an increase of $30,560,665 over the sales of the previous year.

The net income before interest, but after making provision for depreciation of plants and adequate reserves for Federal, Canadian and British taxes on income and profits amounted to		$26,864,297
The net interest charges amounted to		5,643,314
Thus leaving net profits for the year		$21,220,983
The dividends on the preferred stock including dividend payable January 31, 1921, amounted to	$5,200,000	
The dividends on minority stock of subsidiary companies amounted to	18,718	
Making a total of		5,218,718
Leaving surplus for the year applicable to the common stock		$16,002,265
Dividends on common stock (8 per cent) including dividend payable January 31, 1921, amounted to		6,480,000
Leaving balance of surplus for the year		$9,522,265
To which there was added for adjustments made during the year		492,952
Making a total of		$10,015,217
From which there was appropriated and set aside as a reserve to provide for any contingencies that might arise hereafter in connection with inventory valuations, contracts or other matters.		6,000,000
Leaving a balance to be carried to surplus account December 31, 1920, of		$4,015,217
The total surplus at the beginning of the year 1920 amounted to	$52,310,163	
From which there was distributed a common stock dividend of 12½ per cent, February 19, 1920	9,000,000	
Thus leaving surplus amounting to		43,310,163
Which added to the surplus for the year, i. e., $4,015,217, makes the surplus as of December 31, 1920		$47,325,380

DIVIDENDS

Dividends at the rate of 8 per cent have been paid upon both the preferred and common stocks for the year 1920.

TEN-YEAR GOLD NOTES

The company, on August 1, 1920, issued and sold $20,000,000 of 10-year 7½ per cent gold notes which were secured by $25,000,000 of its first and refunding mortgage bonds issued under the terms of the mortgage. As the time was not then favorable for selling bonds, the company sold these notes, the proceeds of which were used in payment for additions to fixed properties.

CHANGES IN ORGANIZATION

After the death of Elisha S. Williams, who, as vice-president, had general charge of the mechanical goods division, the operating departments of the company were reorganized in accordance with the plan of organization indicated elsewhere in this report. The office of second vice-president was created and several of our valuable men in their respective departments elected to such office. It is believed that increased efficiency will result from such change in organization.

STOCK CARRIED FOR EMPLOYES

The item of notes receivable of employes, $7,430,207, appearing in the general balance sheet, is represented by notes of employes given for purchase of shares of the common capital stock of the company secured by 98,326 shares of such stock. Your chairman is of opinion that the making of it practicable under our profit and value sharing plans for our employes to acquire and hold a greater amount of stock than they themselves would otherwise be able to own, thus increasing the personal interest in the prosperity of the company, is of advantage to both company and employe.

In addition to the above, common stock in the amount of $2,427,705 (book value) is being carried under service contracts and agreements with some of the principal officers of the company, as shown in the balance sheet.

INVENTORIES

To meet the heavy decline in prices of certain materials, notably cotton fabrics, inventories have been written down $11,151,444 below cost, thus bringing the inventory valuations down to a conservative basis. This reduction was charged against reserves previously created in anticipation of such a decline in prices. In addition to this write-off of $11,151,444, there was appropriated out of the income for the year 1920 and set up as a reserve the sum of $6,000,000, which your chairman believes is sufficient to take care of any contingencies that might arise hereafter in connection with inventory valuations, contracts, or other matters.

PLANTS AND FIXED PROPERTIES

There has been expended upon the plants and fixed properties of the company during the year 1920, $28,616,616, notably in the enlargement of our tire plants at Detroit, Michigan; Hartford, Connecticut; Providence, Rhode Island, and Indianapolis, Indiana. The work is practically completed and paid for and your chairman feels there will be no necessity for additional expansion of plants or fixed properties for some time to come.

EXPORT BUSINESS

The export sales of the company increased 9.66 per cent, compared with those for the previous year.

Export business during the latter part of the year suffered in common with domestic business from greatly reduced buying.

Plans for further expansion of export business have been temporarily held awaiting more favorable general conditions, but already there are some indications of revival and it is hoped that the company will be justified during 1921 in executing plans which will make the products of the company available, through direct distribution, in every important market of the world.

CRUDE RUBBER AND RUBBER PLANTATIONS

The year 1920 opened with crude rubber (first latex crêpe) at 55 cents a pound and closed below 20 cents a pound. Your company carried over about seven months' supply of crude on hand and to arrive at .2679 cents, which is below the average cost of production, and with the revival of business the price of crude rubber is certain to advance.

While we did not push the production of our estates in Sumatra, owing to the low prices, the amount of rubber received therefrom in 1920 was in excess of the previous year. During the year we have increased the area of our plantations both by development

of land previously owned and by further purchases at favorable prices.

INCREASE IN NUMBER OF STOCKHOLDERS

The following tabulation shows the number of stockholders of the company as of January 15, 1919, and January 15, 1921, respectively:

	January 15, 1919	January 15, 1921
Common stockholders	4,009	11,878
Preferred stockholders	15,030	17,353
Totals	19,039	29,231
		19,039
Increase		10,192

OUTLOOK FOR 1921

The policy of the company for the coming year will be a continuance of the conservatism exercised in the past. It is not proposed to extend its business by any plan involving new construction or otherwise requiring the outlay of further capital, but with the completion of the much needed enlargement of the capacity of its tire plants it is intended to confine the business of the company within its present facilities and to conserve its assets in conformity with the times. Your chairman feels that adherence to this policy will not only insure safety, but that it may reasonably be expected that the profits of the business will be adequate to meet all charges and also provide satisfactory earnings upon the capital stock.

During the year 1920 we lost by death three of our valuable directors: Harry E. Converse, who succeeded his father, Elisha S. Converse, as president of the Boston Rubber Shoe Co., one of our large subsidiaries; Elisha S. Williams, who came to us when we acquired the Revere Rubber Co., and who was a vice-president of our company, and Theodore N. Vail, president of the American Telephone & Telegraph Co., who was an active member of our board, manifesting in every way a deep interest in the affairs of our company and showing every confidence in its future prosperity; also Francis Lynde Stetson, our general counsel for nearly twenty years and one time member of our board. We deeply deplore the losses thus sustained.

It gives me pleasure to refer again to the continued fidelity and ability shown by the officers, heads of departments, our far eastern and foreign staffs, and other employes of the company and its subsidiaries under the somewhat trying conditions of the past year.

Respectfully submitted,
SAMUEL P. COLT, Chairman.

MANAGEMENT

The management of the United States Rubber Co. is in the following competent hands:

DIRECTORS

James S. Alexander, Walter S. Ballou, James G. Brady, Nicholas F. Brady, Middleton S. Burrill, Samuel P. Colt, George R. Deshler, Sir Mortimer B. Davis, James Deshler, James B. Ford, James Newton Gunn, Francis L. Hine, Ernest Hopkinson, Henry L. Hotchkiss, Lester Leland, John W. Davis, Samuel M. Nicholson, Raymond B. Price, Homer E. Sawyer, Charles B. Seger, William H. Truesdale, Frank A. Vanderlip.

The Board of Directors of the United States Rubber Co. met April 21, 1921, for organization and elected the following officers, Executive Committee and Operating Council for the ensuing year, namely:

OFFICERS

Samuel P. Colt, chairman; Lester Leland, vice-chairman; Charles B. Seger, president; James B. Ford, vice-president. Footwear, mechanical goods and miscellaneous: Homer E. Sawyer, vice-president in general charge; Edward J. Coughlin, second vice-president in charge of manufacturing; George H. Mayo, second vice-president in charge of sales. Development and patent departments: Ernest Hopkinson, vice-president in general charge. Tires and accessories: J. Newton Gunn, vice-president in general charge; Charles J. Butler, second vice-president in charge of manufacturing; Samuel Norris, secretary; John D. Carberry, assistant secretary and assistant treasurer. Treasury and accounting: W. G. Parsons, vice-president in general charge; W. H. Blackwell, treasurer; Sherwood S. Green and H. H. Nance, assistant treasurers; William O. Cutter, comptroller; Harold B. Grouse and Herbert M. James, assistant comptrollers; Henry B. Hubbard, financial manager of sales. Purchasing, stores and transportation: Raymond S. Willis, second vice-president in general charge; George E. Smith, auditor; John W. Davis, general counsel; Richard V. Lindabury, New Jersey counsel.

EXECUTIVE COMMITTEE

Samuel P. Colt, chairman; Lester Leland, Charles B. Seger, James B. Ford, Walter S. Ballou, Nicholas F. Brady, James S. Alexander.

OPERATING COUNCIL

Charles B. Seger, chairman; Homer E. Sawyer, J. Newton Gunn, Ernest Hopkinson, W. G. Parsons, R. S. Willis and W. O. Cutter.

THE COMPTROLLER'S REPORT

UNITED STATES RUBBER CO. AND SUBSIDIARY COMPANIES

Consolidated General Balance Sheet, December 31, 1920

ASSETS

Cash	$14,534,846.15	
Accounts receivable	46,329,738.62	
Notes and loans receivable	2,760,589.82	
Finished goods	77,353,921.59	
Material and supplies, including goods in process	46,149,108.89	
Total current assets		$187,128,205.07
Notes receivable of employes given for purchase of common stock and secured by such stock	$7,430,207.04	
Common stock of United States Rubber Co. held under service contracts and agreements	2,427,705.49	
Securities owned and held in insurance fund	2,486,920.05	
Securities owned, including stock of United States Rubber Co. held by a subsidiary company	7,167,536.14	
Plants, properties, and investments, including rubber plantations	177,227,137.18	
Prepaid and deferred assets	5,384,985.94	202,124,491.84
Total assets		$389,252,696.91

LIABILITIES, RESERVES AND CAPITAL

Accounts payable, including acceptances payable for importation of crude rubber		$14,094,388.85
Accrued liabilities		3,874,158.18
Notes and loans payable		49,405,000.00
Total current liabilities		$67,373,547.03
United States Rubber Co., first and refunding mortgage gold bonds, due 1947 ($67,426,800 5 per cent and $25,000,000 6 per cent)	$92,426,800.00	
Less treasury bonds deposited as security for: United States Rubber Co. 5-year 7 per cent secured gold notes $9,000,000.00		
United States Rubber Co. 10-year 7½ per cent secured gold notes 25,000,000.00	34,000,000.00	
	$58,426,800.00	
United States Rubber Co. 5-year 7 per cent secured gold notes due December 1, 1923	6,000,000.00	
United States Rubber Co. 10-year 7½ per cent secured gold notes, due August 1, 1930	20,000,000.00	
Canadian Consolidated Rubber Co., Limited, 6 per cent gold bonds, due 1946	2,600,000.00	87,026,800.00
Total liabilities		$154,400,347.03
Reserve for depreciation of property and plant	$16,648,727.19	
General operating reserves	8,022,615.10	
Reserves for insurance	2,855,277.88	
Reserve for federal taxes and other contingent payments	4,093,874.53	
Reserve for dividends on preferred and common stocks, payable January 31, 1921	2,920,000.00	
Total reserves		$34,540,494.70
Capital stock—preferred	$65,000,000.00	
Capital stock—common	81,000,000.00	
Minority—Canadian Consolidated Rubber Co., Limited, stock	277,200.00	
Total capital stock	$146,277,200.00	
Fixed surpluses—subsidiary companies	$6,709,275.22	
Surplus	47,325,379.96	
Total surpluses	$54,034,655.18	
Total capital stock and surpluses		200,311,855.18
Total liabilities, reserves and capital		$389,252,696.91

Respectfully submitted,
WILLIAM O. CUTTER, Comptroller.

News of the American Rubber Industry

GOODYEAR'S FINANCIAL PLAN COMPLETED

THE FINAL STEP in restoring The Goodyear Tire & Rubber Co. to a sound financial position with a readjusted management under the direction of three voting trustees, was taken April 21, 1921, when a group of bankers offered $30,000,000 of the company's first mortgage 20-year 8 per cent sinking fund gold bonds at 99 and interest. Provision is made for the retirement by lot on each of the semi-annual interest dates of $750,000 of the bonds.

Another banking group will underwrite an issue of $27,500,000 of its 10-year 8 per cent debentures, which are to be offered to its stockholders for subscription. Under the recapitalization the $65,000,000 of the company's old preferred stock remains unaffected. There are authorized $40,000,000 of its prior preferences, of which about $30,000,000 has been taken by merchandise creditors. There will be outstanding about 900,000 shares of its common stock of no par value carried on the books at $1,000,000. Giving effect to the new financing, the company will have as of May 1 total resources of $177,000,000; total property value, less $11,000,000 depreciation, amounting to $54,000,000; current assets, $72,700,000, of which $11,000,000 is cash; total current liabilities, $9,600,000, and working capital in excess of $63,000,000. Reserves of $14,000,000 are set up and all inventories of raw materials as well as all contracts have been written down to the present market. In addition, a total of $43,000,000 has been provided for adjustment of inventories and raw materials not delivered.

During the life of the 20-year first mortgage bonds above referred to, control of the management of the company through the right to elect the majority of the board of directors will be vested in Messrs. Clarence Dillon, of Dillon, Read & Co.; John Sherwin, chairman of the board of the Union Trust Co. of Cleveland, and Owen D. Young, vice-president of the General Electric Co., or their successors, either through management stock or a voting trust.

The problem of readjusting the management will be undertaken at once. Its solution will include, according to general understanding, the withdrawal of Frank A. Seiberling, the president, from active participation in the management.

To consummate this recapitalization took months of effort, more than 100,000 individual consents being required before it could be done. Consents were given by holders of $65,000,000 of the company's preferred stock, $60,000,000 of its common stock and of $85,000,000 of its debt, including contracts and contingent liabilities.

GOODRICH ANNUAL MEETING

At the annual meeting of the stockholders of The B. F. Goodrich Co., held April 20, B. G. Work, Waddill Catchings, H. K. Raymond and W. O. Rutherford were reelected to the board of directors. A. A. Tilney, vice-president of the Bankers Trust Co. and Harold Stanley, vice-president of the Guaranty Trust Co., were elected directors in the places of A. H. Marks and A. B. Jones, whose terms expired and who both resigned. All officers were reelected at the directors' meeting, with the exception of H. E. Raymond, vice-chairman of the board, who, due to retirement from all active business, resigned. C. B. Raymond, former vice-president, was elected vice-chairman of the Board.

Under existing conditions the directors did not deem it wise to declare at this time the dividend on the common stock usually paid May 15. The company is, however, in a strong position and with the resumption of a normal business may be expected to show satisfactory earnings. In accordance with the provisions of the charter, 11,880 shares of the preferred stock were retired.

ANNUAL REPORT OF THE INTERCONTINENTAL RUBBER CO.

The following report of the Intercontinental Rubber Co., 15 Exchange Place, Jersey City, New Jersey, covers the fiscal year ended December 31, 1920:

CONDENSED BALANCE SHEET—DECEMBER 31, 1920

Assets		
Investments in merged and subsidiary companies:		
By cash	$4,478,944.09	
By stock issues	28,198,575.30	$32,677,519.39
Patents (exclusive of subsidiary companies)		15,141.77
Accounts and notes receivable, etc.:		
Advances to subsidiary companies	$361,097.25	
Sundry accounts	75,936.30	437,033.55
Advances on rubber		148,298.48
Investment securities		1,014,030.50
Cash		5,219.63
		$34,297,243.32
Liabilities		
Capital stock: common		$29,031,000.00
Bills and accounts payable, taxes accrued, etc.		219,707.39
Reserve accounts		564,321.21
Surplus (as below)		4,482,214.72
		$34,297,243.32
Surplus Account		
Surplus December 31, 1919		$4,446,079.57
Total profits and income from investments, etc.	$201,666.40	
Less:		
Administration, general expenses and taxes	67,498.42	
	134,167.98	
Depreciation in market value of securities at December 31, 1920	71,837.25	62,330.73
		$4,508,410.30
Charges against surplus:		
Cost of caring for Mexican properties (shut-down expenses) and experimental expenses 1920		26,195.58
Surplus December 31, 1920		$4,482,214.72

Important experimental and preliminary development work has been continued on the company's Arizona guayule plantation, and further work is being undertaken this year in California.

Operations at Torreon, Mexico, were resumed December 15, 1919, but revolutionary activity, fuel shortage and other hindrances forced the suspension of operations. During the campaign 2,004,062 pounds of dry rubber were produced. Pending the bearing stage of the Sumatra plantation where planting began in the spring of 1918 and which is now comprised of approximately 3,300 acres of young trees, a portion of the company's surplus resources has been employed in purchasing rubber and establishing or expanding trade relations with consumers.

FINANCIAL NOTES

The Federal Rubber Co., Cudahy, Wisconsin, reports net loss for 1920 of $20,737 after charges and taxes. A deficit of $719,490 is reported after deducting cost of selling additional preferred stock. For 1919 the company showed surplus of $725,440. Net sales amounted to $13,911,990 as compared with $13,964,580 for 1919 when the surplus for the year amounted to $725,440.

The Rubber Corporation of America, 240 West 55th street, New York, N. Y., had filed against it an involuntary petition in bankruptcy on April 14, 1921, in the United States District Court, by three creditors whose claims aggregated approximately $146,-

542. The petitioners are the Equitable Trust Co., $70,042; National Park Bank, $72,500, and Blauvelt Brothers, Inc., $4,000. Liabilities are placed at $1,000,000 and no estimate of assets is given.

On March 16, 1920, the company's assets were placed at $1,477,889 and liabilities at $475,925. Until it is learned whether a receivership is necessary the appointment of a receiver has been postponed.

The Rubber Corporation of America is a Delaware corporation, dealing in tires, with branches in six of the large cities.

DIVIDENDS DECLARED

COMPANY	STOCK	RATE		PAYABLE	STOCK OF RECORD
Corn Products Refining Co	Com.	$1.00	q.	Apr. 20	Apr. 4
Corn Products Refining Co	Com.	$0.50	ex.	Apr. 20	Apr. 4
Corn Products Refining Co	Pfd.	$1.75	q.	Apr. 15	Apr. 4
Hodgman Rubber Co	Pfd.	2%	q.	May 1	Apr. 15
Hood Rubber Co	Com.	$1.00	q.	Mar. 31	Mar. 19
Hood Rubber Co	Ffd.	1¾%	q.	May 2	Apr. 20
India Tire & Rubber Co., The	Com	2%	q.	Apr. 1	.....
India Tire & Rubber Co., The	Pfd.	1¾%	q.	Apr. 1	.....
Kelly-Springfield Tire Co	Com.	3% q. stk.		May 2	Apr. 15
Kelly-Springfield Tire Co	8% Pfd.	$2.00	q.	May 16	May 2
Monatiquot Rubber Works	Pfd.	$1.75	q.	Apr. 1	Mar. 24
New Jersey Zinc Co., Inc	Com.	2%	q.	Apr. 30 July 30	May 10 Aug. 10
United Shoe Machinery Co	Com.	$0.50	q.	Apr. 5	Mar. 21
United Shoe Machinery Co	Pfd.	$0.37½	q.	Apr. 5	Mar. 21
United States Rubber Co	Com.	2%	q.	Apr. 30	Apr. 15
United States Rubber Co	1st pfd.	2%	q.	Apr. 30	Apr. 15
Westinghouse Electric & Manufacturing Co.	Com.	$1.00	q.	Apr. 30	Mar. 31
Westinghouse Electric & Manufacturing Co.	Pfd.	$1.00	q.	Apr. 30	Mar. 31

NEW YORK STOCK EXCHANGE QUOTATIONS

APRIL 25, 1921

	High	Low	Last
Ajax Rubber Co., Inc	35⅞	35⅛	35⅛
The Fisk Rubber Co	16¾	15¾	15¾
The B. F. Goodrich Co	38⅝	38⅛	38⅛
The B. F. Goodrich Co., pfd	....	....	....
Kelly-Springfield Tire Co	44	43	43½
Kelly-Springfield Tire Co., pfd	....	....	....
Keystone T. & R. Co	15⅞	15¾	15⅜
Lee R. & T. Corp	29	28½	28½
United States Rubber Co	76	74	74¾
United States Rubber Co., 1st pfd	101¼	101¼	101¼

AKRON RUBBER STOCK QUOTATIONS

The following are closing quotations of April 19, supplied by The App-Hillman Co., Second National Building, Akron, Ohio:

	Bid	Asked
American R. & T. Co., com	40	60
Amazon Rubber Co., The	25	35
Firestone T. & R., com	85	90
Firestone T. & R., 6% pfd	85	..
Firestone T. & R., 7% pfd	75	76
General T. & R. Co., The, com	190	250
General T. & R. Co., The, 7% pfd	75	85
Goodrich, B. F., The, com	37	38
Goodrich, B. F., The, pfd	75	78
Goodrich, B. F., The, 5-yr. 7% notes	90	91
Goodyear T. & R. Co., The, com	12½	13
Goodyear T. & R. Co., The, 7% pfd	36½	37½
India T. & R. Co., com	100	130
India T. & R. Co., 7% pfd	..	80
Mason T. & R. Co., The, com	15	18
Mason T. & R. Co., The, 7% pfd	55	60
Marathon T. & R. Co., com	3	4
Miller Rubber Co., The, com	..	75
Miller Rubber Co., The, 8% pfd	73	76
Mohawk Rubber Co., The	100	125
Phoenix Rubber Co., com	..	18
Phoenix Rubber Co., pfd	..	88
Portage Rubber Co., The, com	20	24
Portage Rubber Co., The, 7% pfd	30	35
Republic Rubber, com	¾	1
Republic Rubber, 7% pfd	14	16
Republic Rubber, 8% pfd	8	10
Rubber Products Co., The	..	100
Standard Tire Co., com	..	100
Standard Tire Co., pfd	..	90
Star Rubber Co., com	..	95
Star Rubber Co., 8% pfd	..	100
Swinehart T. & R., com	30	50
Swinehart T. & R., 7% pfd	..	70

NEW INCORPORATIONS

Barash Bros., March 30 (New York), $10,000. A., H., and S. Barash; L. Lerner—all of 116 Nassau street, New York City. To manufacture belting and elastic notions.

Ceylon Products Mfg. Co., Inc., April 14 (New York), $5,000. F. M. Dayton; H. Tresselt, both of 2122 La Fontaine avenue, Bronx, New York; C. Douglas, 272 Pacific avenue, Jersey City, New Jersey. To manufacture rubber products.

Cross Laboratories, Inc., March 24 (New York), $50,000. J. H. Sears; J. L. Watson, both of 37 Wall street, New York City; F. H. Butehorn, 764 St. Johns Place, Brooklyn—both in New York. To manufacture rubber cement, tires, etc.

Currie Brothers Co., April 19 (Delaware), $500,000. Corporation Service Co., Wilmington, Delaware. To manufacture tires.

Direct Rubber Co., March 15 (New Jersey), $500,000. J. J. Moriarty, 206 Conant street, Hillside; S. C. Clark, 1074 North avenue, Elizabeth; W. S. Chinery, 30 Nye street, Newark—all in New Jersey. Principal office, 46 Paterson street, New Brunswick, New Jersey. Agent in charge, J. P. Kirkpatrick. To manufacture, purchase and sell tires and tubes.

F. & L. Battery & Supply Co., April 12 (New Jersey), $100,000. R. Feldsher, 114 South Warren street; C. Fishberg, 475 Hamilton avenue; J. Lens, 11 Cooper street—all of Trenton, New Jersey. Principal office, Room 817, Broad Street Bank Building, Trenton, New Jersey. Agent in charge, Forman & Levy. To buy, sell, repair and manufacture automobile supplies and equipment.

Liberty Distributors, Inc., April 13 (Delaware), $100,000. H. G. Eastburn; W. F. Bouzarth; M. E. Doto—all of Wilmington, Delaware. To manufacture tires and tubes.

Middlesex Rubber Co., March 29 (Massachusetts), $50,000. G. E. Jeandheur, 1277 Commonwealth avenue, Boston; M. F. Culliney, 15 Olney street, Dorchester; H. M. Clifford, 51 Palmer street, Arlington—all in Massachusetts. Principal office, Reading, Massachusetts. To manufacture and sell all kinds of rubber goods.

Oppenheimer Trading Corp., April 12 (New York), $500. W. S. Dryfoos, 80 Woodland avenue, New Rochelle; I. B. Levine, 408 Greene avenue, Brooklyn; L. H. Axman, 1229 Park avenue, New York City—all in New York. To manufacture rubber, etc.

Perfection Tire Distributors, Inc., April 4 (New York), $25,000. B. Levy, 234 Pulaski street; C. Haas, 1320 53rd street—both in Brooklyn, New York. To manufacture tires.

Ray Puncture Proof Tire Co., March 14 (Illinois), $1,000,000. H. E. Henke, 205 West Harrison street; J. C. Le Due, 2415 Michigan avenue; G. H. Bryant, 410 South Michigan avenue; H. C. Rowe, 4401 Sheridan Road—all in Chicago; F. C. Huwen, Glen Ellyn, both in Illinois. Principal office, 322 South Michigan avenue, Chicago, Illinois. To manufacture tires.

Rochester Rubber Cement Corp., March 24 (New York), $10,000. G. A. Veomett, 565 Conkey avenue; J. T. Voll, 342 avenue D; F. E. Frey, 86 Stillson street—all of Rochester, New York. Principal office, Rochester, New York. To manufacture rubber cement.

Rubber Fusing Company of New England, Inc., March 28 (New York), $10,000. M. A. Newman, Sr. and Jr., both of 870 East 170th street; M. Ade, 1372 Gray street—both in Bronx, New York. To manufacture rubber tires.

Scottish Tire & Rubber Co., Inc., April 14 (New York), $200,000. J. J. Graham, 248 75th street; W. J. Gillespie, 30 Church street, both of Brooklyn; D. C. McHarg, 116 Nassau street, New York City—both in New York. To manufacture tires, etc.

Security Stopper Co., March 1 (Massachusetts), $50,000. H. P. Roberts; F. H. Mills; F. H. Rowe—all of 50 Congress street, Boston, Massachusetts. Principal office, Boston, Massachusetts. To manufacture and sell a newly invented detachable stopper composed of steel, nickel and rubber.

Solimine Sales Corp., April 6 (New York), $10,000. F. Vitale, 226 Greene avenue; D. Silverman, 110 Louisa street, both of Brooklyn; R. Blando, 20 Broad street, New York City—both in New York. To sell rubber goods.

Storer Rubber Co., April 8 (Massachusetts), $200,000. F. E. Storer, 26 Fellesway West; F. E. Barnes, 456 Medford street, both of Somerville; W. R. Storer, 116 Glenville avenue, Allston—both in Massachusetts. Principal office, Boston, Massachusetts. To deal in druggists' rubber goods, etc.

Synthoid Co., Inc., The, January 31 (Massachusetts), $50,000. T. L. Bronkhorst, president, 128 Oxford street, Cambridge; F. W. Smith, treasurer, 37 Warner street, Boston; A. V. Grimes, clerk, 51 Columbia street, Brookline—all in Massachusetts. Principal office, Boston, Massachusetts. To manufacture and deal in rubber, rubber cement, etc.

Tiretite Rubber Co., April 13 (Delaware), $100,000. Delaware Registration and Incorporators Co., Wilmington, Delaware. To manufacture and sell tubes, tires and casings.

Union Tire Co., March 7 (Indiana), $100,000. S. A. Deming, president; G. M. Medlam, vice-president; J. K. Redmond, secretary and treasurer. Principal office, 154 South Illinois street, Indianapolis, Indiana. To distribute tires and tubes.

RUBBER BUSINESS IMPROVING, SAYS COLONEL COLT

The following message of encouragement and confidence in the immediate future of the rubber industry, comes from Colonel Samuel P. Colt, chairman of the Board of Directors of the United States Rubber Co.

"Our company has every cause to be doubly proud of its record during the past twelve months. Notwithstanding the stringency of money and the tremendous fall in prices,—for instance crude rubber which receded from 55 cents to below 20 cents a pound, and cotton fabric prices cut in two—we have been able to meet all shrinkages from reserves previously provided and have further, out of the surplus earnings for the year 1920 set up another reserve of $6,000,000 to meet any contingency that may hereafter arise, not that we expect it will be needed, but in order to be on the safe side.

"Our earnings for the year 1920 showed about $10,000,000 over and above all dividend requirements and we have made our regular dividends of 8 per cent upon both preferred and common stocks. It is not that, however, that we feel so proud of, as the fact that every bill has been paid on the day it was due.

"Now it is always somewhat risky to predict as to the future, but I do feel satisfied that we have seen the worst of the depression and that from now on business is going to be on the mend—our business is on the mend in its various departments today. The tire trade, which during the blue days was predicted would never return, has almost reached normal, and I still believe and predict that the number of tires used in the year 1921 will be greater than in 1919 or 1920, or in any previous year in the history of the world, and our company is going to get its fair share of the tire business and, therefore, my message is one of encouragement and confidence in the future."

A WELL-KNOWN RUBBER RECLAIMER

CLARK W. HARRISON, president and treasurer of the Bloomingdale Rubber Co., New York, N. Y., was born in Glasgow, Missouri, in 1868. He received his education at Pritchett College, Glasgow, and Washington University, St. Louis, Missouri, graduating in 1888.

Underwood & Underwood, N. Y.

CLARK W. HARRISON

His first business connection was with the Shickle, Harrison & Howard Iron Co., St. Louis, Missouri, cast iron pipe founders. In 1891 he was made secretary and treasurer of the Howard, Harrison Iron Co., Bessemer, Alabama; in 1894, vice-president and manager of the South Pittsburg Pipe Works, Tennessee; in 1899, foreign sales manager of the United States Cast Iron Pipe & Foundry Co. with headquarters in London, England; in 1906, waterworks engineer in London, England, and in 1911 became identified with the rubber industry as treasurer and manager of the Bloomingdale Rubber Co., rubber reclaimers, New York, N. Y. In 1919 he was elected president in addition to the office of treasurer.

Mr. Harrison is a member of The Rubber Association of America, Inc., in which he holds the office of vice-chairman of the Reclaimers' Division. His clubs are the Engineers' Club, New York, N. Y., Wykagyl Golf Club, New Rochelle, N. Y., and Governors Island Club, New York, N. Y.

NEW YORK RUBBER INDUSTRIES INCREASE EMPLOYMENT

According to the Bureau of Statistics and Information of the New York State Industrial Commission, which has drawn its conclusion from reports by 1,648 firms with over 475,000 employes, more than one-third of the factory workers in the state, and a weekly pay-roll of over $12,500,000, the fur, leather and rubber goods group of industries shows a six per cent increase in working forces in February. Among the gains reported are five per cent in rubber goods, and three per cent in boots and shoes.

The percentage of change in the New York State rubber and gutta percha goods industry in employes from December, 1920, to January, 1921, was —9.2; from January, 1921, to February, 1921, was +4.9; in total wages from December, 1920, to January, 1921, was —15.8; from January, 1921, to February, 1921, was +0.9; in employes from January, 1920, to January, 1921, was —34.6; for February, 1920, to February, 1921, was —29.7; in total wages from January, 1920, to January, 1921, was —39.6; from February, 1920, to February, 1921, was —31.6. The ratio of February, 1921, to June, 1914, the latter as one hundred per cent basis shows employes 116 and total wages 234. The percentage of distribution of employes reported in February was 0.8.

THE RUBBER TRADE IN THE EAST AND SOUTH

By Our Regular Correspondent

NEW YORK

ALBERT V. W. TALLMAN, broker in crude rubber, etc., will occupy new offices at 35 Stone street, New York, N. Y., to which the business will be removed from 280 Broadway on May 1.

G. E. Habich, dealing in crude rubber, is now located at 24 Stone street, New York.

On May 1, Richard H. Toeplitz, dealer in crude rubber, will consolidate his business with the Crude Rubber Brokerage Co., Inc., 198 Broadway, conducting the business of both concerns under the name of the Crude Rubber Brokerage Co., Inc., with offices at 99 Water street, New York, N. Y.

J. Frank Dunbar Co., Inc., dealer in crude rubber, on April 18 moved from 82 Beaver street to 113-115 Broad street, New York, N. Y.

The Goodyear Tire & Rubber Co.'s eight-story and basement building located at the northeast corner of Jackson avenue and Honeywell street, Long Island City, was purchased by W. C. Durant for the use of the Durant Motor Co., of New York. The transaction is reported to have involved $2,000,000.

John S. Lamson & Bro., Inc., successor to Reese, Lamson & Buckley, Inc., importer and dealer in manganese, asphaltum, pitch, waxes and chemicals, and eastern and foreign selling agent for Robertson process "M-R" mineral rubber, formerly at 347 Madison avenue, expects to occupy its new offices at 100 John street, New York, on May 1. The entire building has been taken and the basement and first floor will be used for warehousing stock, including a number of items used by the rubber trade.

The Prospect Tire & Rubber Co., Inc., 735 Main street, Buffalo, New York, which was incorporated March 18, 1919, under the laws of Delaware, with a capital of $500,000, to manufacture cord tires and acquire property for the planting, cultivation and growing of rubber trees, has elected the following officers and directors for the current year: J. T. Barnes, president; J. H. Prendergast, vice-president; J. L. Rosenblatt, general manager and treasurer; F. E. Grubb, secretary; D. Rosenblatt, assistant treasurer; and H. Mathias, superintendent. For the time being, Prospect cord tires will be manufactured by reliable tire manufacturers, according to specifications and from equipment belonging to the company. Original intentions were to build a factory at Prospect, New York, but now the purchase of a factory in Buffalo is being considered.

The Master-Craft Fountain Pen Corporation was incorporated at Albany, New York, on February 8, 1921, with a capital stock of $250,000. The executive offices are at 59 Park Place, New York.

PENNSYLVANIA

The Hydro-United Tire Co., 10th street and Columbia Avenue, Philadelphia, Pennsylvania, manufacturers of the toronized tire, has increased its capital stock from $1,000,000 to $100,000,000.

The Link-Belt Building & Loan Association, capitalized at $2,000,000, has been incorporated under the laws of Pennsylvania by the employes of the Link-Belt Company, under the building association laws of the state and of the banking commissioner. It has the endorsement and support but is not a subsidiary of the Link-Belt Co., the management being entirely in the hands of the employees.

Meyer Davis has begun a trip of over 20,000 miles as the first representative of the H. H. Robertson Co., Pittsburgh, Pennsylvania, to visit Chinese, Japanese, Philippine and other

Far Eastern points. He sailed from San Francisco on April 8, for Honolulu.

SOUTHERN NOTES

The present officers of the Armorcord Rubber Co., Morgantown, West Virginia, are: J. H. McDermott, president; J. A. McLane, vice-president and F. M. Cain, secretary-treasurer.

H. Githens, general sales manager of the Federal Rubber Co., Cudahy, Wisconsin, is at the present time making a tour of Federal warehouses in the south and southwest.

KELLY-SPRINGFIELD'S NEW TIRE FACTORY

INCREASING DEMANDS made it necessary for the Kelly-Springfield Tire Co. to choose a site for another plant in addition to that in Akron, and Cumberland, Maryland, was selected as the most advantageous spot. The plant was erected on property of more than one hundred acres along the Potomac River, about a mile from the heart of the city. The plant is served by three trunk line railroads, one of which skirts the property.

The property consists of power plant, pump house, machine shop, chemical building and the main factory building. The latter is two stories high with mezzanine and basement, and consists of a main wing 760 by 120 feet, to which is connected five wings, each being 405 by 60 feet, and each wing is connected to the other. The floor area is approximately 20 acres. The entire building and its foundations are of extra heavy construction and have been designed to carry additional stories. The machinery contained therein is of the most modern designs. The arrangement from the receipt of raw materials, through the various processes of manufacture to the shipping of finished goods is one continuous progressive movement, no back haul nor rehandling of any materials or goods in process is necessary.

The power plant is equipped with the most modern apparatus and has ready for operation six 750 horsepower boilers capable of developing a total of from 9,000 to 12,000 horsepower. All coal and ash are handled by automatic machinery, making labor unnecessary.

There are also installed and ready for operation mammoth turbines as well as condensers, motor generator sets, pumps and all other necessary apparatus for efficient operation. The circulating pumps are capable of pumping thirty million gallons of water each day. The electric current is carried into the main factory distributing stations by large copper bars through tunnels, and from there to the various sub-stations by lead cable.

The pump house contains a most complete equipment of modern standard and special pumps from a 500-gallon to a 6,000,000-gallon compound pump, together with accumulators, air compressors, tanks, etc. Water is taken from the river through seven-foot tunnels into a pit in the pump house; all construction is below the river bed.

The chemical building is about 300 feet long, 55 feet wide and the greater portion two stories high, and contains complete apparatus and equipment for every conceivable character of rubber industry experimental work. Two large general laboratory rooms are provided as well as a number of special rooms for research work. Complete equipment for experimental tire-making on full-sized scale is also installed in this building.

In addition to the buildings mentioned, a temporary hospital building is erected as well as a large fireproof garage and several smaller auxiliary buildings, all of the finest modern design and construction, and properly equipped for their purpose.

The entire plant is completely protected by automatic sprinkler system, fire hydrants, hose and necessary apparatus of this character. One and one-half years were consumed in building this plant.

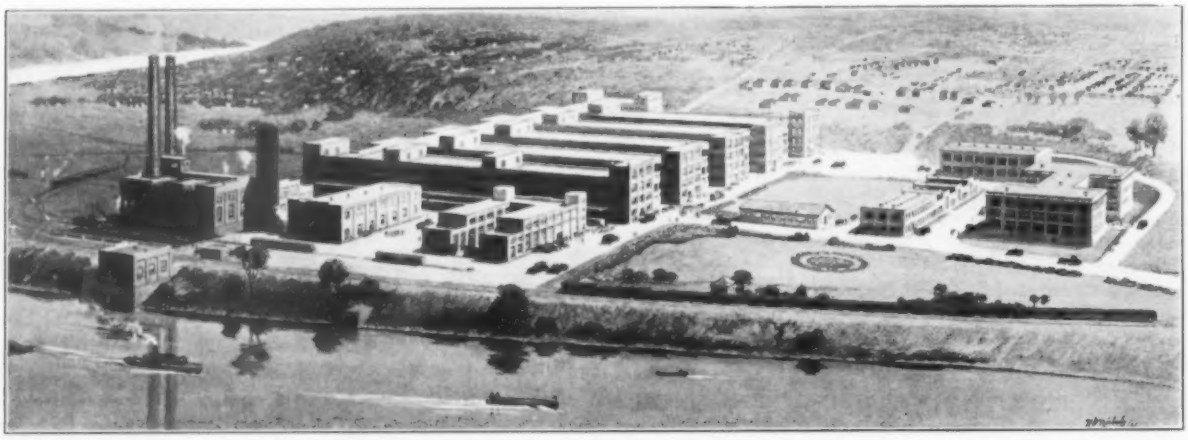
A VETERAN IN RUBBER MANUFACTURE

ROBERT E. HOTCHKISS, whose likeness is here shown, has a record of service that few can equal. Very briefly he lists his activities as follows: Born in 1849, the year the Naugatuck railroad was completed to Waterbury, Connecticut. He was with Goodyear's India Rubber Glove Manufacturing Co., Naugatuck, Connecticut, from boyhood until 1881, when he went to the Boston Rubber Co., Chelsea, Massachusetts, as superintendent. With this firm he remained until the end of 1894, including a few months during which he was transferred to the Granby Rubber Co., Granby, Canada.

ROBERT E. HOTCHKISS

Poor health then led him into advisory and consulting work. In 1894 he returned to Goodyear's India Rubber Glove Manufacturing Co. in a clerical capacity for two years, followed by two years in the pay of the Liverpool Rubber Co., Limited, Liverpool, England, although actually employed only one year. Part of 1898 and 1899 he was with Augustus O. Bourne in Providence, Rhode Island, and part of 1899 and 1900 with George H. Hood in Boston, Massachusetts, engaged on special work pertaining to litigation, etc.

In 1900 he went abroad and remained eight years before returning to America. For four years he was with the Liverpool Rubber Co., Limited, Liverpool, England, followed by nearly two years with the North British Rubber Co., Limited, Edinburgh,



PLANT OF THE KELLY-SPRINGFIELD TIRE CO., CUMBERLAND, MARYLAND

Scotland, this latter connection having been established by an advertisement seen by Mr. Hotchkiss in THE INDIA RUBBER WORLD. He then went to the Norway Rubber Co., Mjondalen, Norway, as advisory superintendent, returning to the United States in September, 1908. He is now retired, living at Vineland, New Jersey, healthy, happy and as much interested in rubber as ever.

THE RUBBER TRADE IN NEW JERSEY

By Our Regular Correspondent

TRENTON NOTES

TRENTON RUBBER MANUFACTURERS are greatly pleased with the outlook in the tire and mechanical goods trade, and report that the situation is gradually showing signs of improvement. The plants manufacturing tires have not yet reached capacity output, but the situation is regarded as much better than at the close of the year 1920. With many of the factories working on only part time, it is believed that the regular amount of buying during the past few months will eventually result in a tire shortage. This is one of the things that causes optimism among the tire manufacturers. The Essex Rubber Co., manufacturers of tubes and heels, has been running to capacity for several weeks. Company officials report that they have enough work on hand to last for some time.

C. Edward Murray, Jr., vice-president of the Empire Rubber & Tire Corporation, Trenton, in discussing the situation, said: "The tire industry has been under the influence of unfavorable circumstances for more than nine months past. There is a much better tone noticeable now, and the next two or three months will undoubtedly bring further improvement. Our tire and tube departments are running 70 per cent capacity."

John S. Broughton, president of the United & Globe Rubber Co., Trenton, says he believes the tire crisis has been reached, judging from the number of new orders his plant is receiving. The Thermoid, Ajax and Bergougnan companies also report an increase in business, with more men at work.

Judge Joseph L. Bodine, in the United States District Court at Trenton, has issued an order authorizing Arthur H. Wood and C. Edward Murray, Jr., as receivers for the Empire Rubber & Tire Corporation, to issue receivers' certificates in the sum of $300,000. The receivers were first authorized to borrow $50,000 on behalf of the company, and the court allowed $250,000 additional, to give sufficient funds to conduct the plant. The receivership was requested by the Big Bend Mining Co., of Philadelphia, Pennsylvania, who claimed that while the company is solvent, its obligations amount to more than its ready cash. The mining company alleged that the Empire company owed $12,710.35 for coal, of which $5,760.35 was for coal delivered during January and February last, and long overdue. The mining company also holds notes of the rubber company to the amount of $6,950. The complainant expressed unwillingness to start suit, as other companies were on the verge of suing the defendant company, which would result in a multiplicity of actions and the rubber company's business would thereby be destroyed.

The Empire rubber plant is appraised at over $2,000,000, and with merchandise and other assets of about $3,500,000, the business would eventually be put on a paying basis. The liabilities, excluding capital stock, were given as $1,500,000. The answer of the Empire company admitted all the charges in the bill of complaint. The decree of Judge Bodine, in naming the receivers, stated that the company was judged solvent, but had no funds to meet its obligations.

The Empire company, which is one of the largest and oldest companies of its kind in this section, was chartered under the laws of Virginia, and has its only factory in Trenton. The plant employs more than 1,000 hands when in full operation.

Edmund W. Craft and A. H. Greywacz, of the Thermoid Rubber Co., recently read papers on the rubber industry before the Engineers' Club of Trenton. Mr. Craft showed how the rubber was cultivated and prepared, while Mr. Greywacz gave technical features of the process of manufacture. Both papers were illustrated with lantern slides.

The Puritan Rubber Co., whose storehouse was destroyed by fire some time ago, has decided not to rebuild but to use another section of the plant for storage purposes. The Fineburg Rubber Co., whose plant near the Puritan works was also destroyed by fire, has decided not to rebuild at this time.

The Luzerne Rubber Co. has completed its new addition on Muirheid avenue, a two-story structure 60 by 60 feet, which is now in operation. The company has additional land in East Trenton for future plant extensions.

The Acme Rubber Manufacturing Co. has dropped temporarily the idea of enlarging its Trenton plant. Some time ago the company had plans drawn for a one-story addition, 90 by 300 feet, to be erected on East State street at a cost of $60,000. When the plans were completed and the contract awarded the slump hit the rubber industry and the Acme company decided not to rebuild until the business situation brightened somewhat.

The United Tire Co., Trenton, is the first tire company to announce a free tire service to motorists, no matter what make of tire they use.

The John E. Thropp Sons Co., Trenton, manufacturer of automobile tire molds and tire-making machinery, is erecting a new forge shop and other additions to the works. The company is now manufacturing a new tire-making machine designed for the manufacture of cord tires.

Some of the Trenton rubber establishments still employ women in the tire-making departments. During the war, when male help was at a premium, women were given jobs in the rubber plants to learn tire-making. At the close of the war some of the manufacturers laid off the women workers. One tire manufacturer states that there was no saving in hiring women, because it was necessary to hire either men or boys to assist them in the heavy work.

Joseph S. Papier, proprietor of the Papier Auto Supply Co., has been made the Trenton agent for Lee tires.

MISCELLANEOUS NEW JERSEY NOTES

The Sterling Tire Corporation, Rutherford, New Jersey, announces that in the future it will not sell its own products through the Rubber Corporation of America. The Sterling company reports a revival of business and the plant is now running about 70 per cent of its capacity. The plant is expected to be in full operation in a short time.

Papers in two suits against John P. Kilpatrick, appointed by the Court of Chancery last November as receiver of the Stanwood Rubber Co., an insolvent concern, have been filed in the county clerk's office at Elizabeth, New Jersey. One plaintiff, Edward Hutchins of Eau Claire, Wisconsin, alleges that he performed service as engineer and architect for the company's plant on the Newark-Elizabeth line. He avers that he was promised compensation at the rate of 7½ per cent of the total cost of all work accomplished, which amounted to $393,293.50 on November 22, the day the concern went into the hands of a receiver. Mr. Hutchins claims compensation of $29,497.01, a portion of which has been paid, and he seeks $20,000 covering the remainder and interest. The Union County Trust Co. holds a $300,000 mortgage made by the rubber company, and claims that this is subject to the lien claim. The other plaintiff is the Gillette Rubber Co., who claims $75,000 for machinery and other equipment, for which no recompense has been received.

THE RUBBER TRADE IN RHODE ISLAND

By Our Regular Correspondent

MAY DAY found little change in the industrial situation among the rubber manufacturing concerns of Rhode Island. And the same applies to textile concerns, whose products enter into tire manufacture. Several of the rubber plants are entirely closed, others are operating on shortened time schedules or with curtailed wage, or both, and few are receiving any volume of orders for production.

While the situation has been very discouraging for several months past, the immediate future does not seem to hold out any very roseate prospects. Although there have been announcements of an opening of some of the plants early in May, the outlook is not especially reassuring to either the manufacturers or the operatives. Some of the concerns that have been running their plants without material curtailment report that, while they are holding their own, they are not receiving many new orders.

Official announcement was made on April 18 that the Alice mill of the Woonsocket Rubber Co. would reopen on May 9, when the calender room resumes operations. The reopening, department by department, as customary, is expected to bring about resumption of work in the making room about May 13. This applies only to the Alice mill, no plans having been decided upon for the opening at that time of the Millville mill, which has been shut down since before Christmas. The Alice mill has been closed since February 19.

It was announced that production would probably be limited to from 60 to 75 per cent. At first a five-days-a-week schedule will be in force, and the number of employes will be reduced. It was stated at the mill that probably about 1,200 operatives would be put to work. In normal times the plant gives employment to about 1,800. The schedule of wages will be the same as was in effect at the time of closing on February 19.

Bristol's small army of unemployed took courage the day following the announcement at Woonsocket, when notice was given that, beginning May 9, the output was to be substantially increased in the Keds (shoe) division of the National India Rubber Co. It is also said that with additional orders, work in other departments of the plant will also be gradually increased. About 3,200 persons are now on the pay-roll of the National company, as against 4,600 during the rush periods of the war.

The following appointments and changes have been made at the factory of the National company during the past month: George Fleck, to be assistant foreman in charge of all rack system work, including machine lasting work and rack method in men's making department, and to assist Mr. Edmonds in the packing room; James McGovern, to be section foreman in charge of the stock room.

A contract has been awarded by the joint standing committee of the Woonsocket Fire Department to the Fabric Fire Hose Co., of New York, of 950 feet of hose at $1.25 per foot. The hose selected is double-jacketed and wax and gum treated. The same company submitted bids on other grades at $1.15 and $1.08. Other bidders were Bilateral Fire Hose Co., Eureka Fire Hose Co., Rubber Combination of America, C. C. C. Fire Hose Co., W. M. Farwell, American-LaFrance Fire Engine Co., and Combination Ladder Co.

The Manhasset Manufacturing Co., with main office at Providence, Rhode Island, manufacturer of tire fabrics and yarns, announce that Robert W. Boys has accepted the position of agent in Putnam, Connecticut.

ENGINEERING SCHOOL OF DRAWING

In rubber manufacturing practice there is constant need for trained engineering ability and facilities for the development of new ideas and inventions, designing new tools and machines, and otherwise perfecting equipment for production from an engineering standpoint. To provide facilities of this sort the Engineering School of Drawing has been established at 457 Main street, Springfield, Massachusetts, by William Roberts, who has specialized in such work, particularly in hard rubber and tires, as production and efficiency engineer.

THE RUBBER TRADE IN MASSACHUSETTS

By Our Regular Correspondent

A CANVASS of the rubber goods manufacturing situation in Massachusetts indicates that general business conditions have not improved as rapidly as had been expected at the beginning of the year. Since February there has been an increase in orders and a more confident feeling regarding the future. A marked improvement in most lines has been felt since April 1, and as jobbers' stocks are small, an increased volume is looked for in all lines. The belief seems to be general that if Congress promptly enacts an equitable and reasonably simple tax law and a tariff bill protecting American capital and labor against the low wages of Europe, business should gradually become normal and be on a much sounder basis than it has been for the past eight years.

Proofed fabric manufacturers report that business is gradually getting back to normal and some companies hope by autumn to be running practically to capacity. While conditions in the rubber heel, sole and molded goods trade are not yet normal, the outlook appears much brighter than it did two months ago. One company reports running on full time for eight weeks past with business showing a decided improvement. Winter rubber footwear is, of course, at a standstill with autumn orders coming in late and in decreased volume. Canvas footwear, however, has started very well. With dealers' stocks below normal and an unusually early spring, dealers are ordering briskly to replenish broken stocks. Tires are much less in demand than during the past few years, but with greatly increased activity in the automotive industry since April 1 a fairly good spring and summer tire business is anticipated.

MISCELLANEOUS MASSACHUSETTS NOTES

The newly elected officers of the Acushnet Process Co., Inc., New Bedford, Massachusetts, are as follows: Philip E. Young, president; John S. Lowman, vice-president; Lothar E. Weber, secretary and treasurer; Flora M. Stewart, assistant treasurer.

The Stedman Products Co., South Braintree, Massachusetts, has been organized as a subsidiary of the Monatiquot Rubber Works Co., maker of "Naturized" rubber, to market its sole, heel and flooring products.

The New England Tire & Rubber Co. has completed its new factory at Holyoke, Massachusetts, which has a capacity of 1,000 tires a day. The Boston agent for Holyoke cord tires, the City Rubber Co., 288 Columbus avenue, announces that the fire departments of Boston, Cambridge and Somerville are using these tires.

Frederick N. Hamerstrom, for the past two years vice-president and director of sales for the Essex Rubber Co., Trenton, New Jersey, has been appointed sales manager for the Converse Rubber Shoe Co., Malden, succeeding E. B. Pearson, who has been made manager of the finance department of the Converse company.

The window displays of Converse tire and footwear making which have been attracting attention in Boston recently formed one of the most interesting exhibits at the Malden Industrial Exposition, held under the auspices of the Malden Chamber of Commerce, an event in which some fifty different manufacturing firms were represented.

B. H. Pratt, general manager of the Federal Rubber Co., Cudahy, Wisconsin, has just completed a business tour of the New England states.

After a brief shut-down the Converse Rubber Shoe Co., Malden, Massachusetts, resumed operations on a five-day week April 1, and reports the demand for tennis lines of footwear considerably above normal.

BOSTON NOTES

The Rubber Proofing and Rubber Clothing Divisions of The Rubber Association of America, Inc., composed of representatives of plants throughout the country, held postponed annual business meetings, election of officers and a joint luncheon at the Copley-Plaza Hotel on March 30. In the morning, following a round-table discussion of business conditions, manufacturing and technical problems, the Proofing Division elected A. W. Warren, of the Hodgman Rubber Co., Tuckahoe, New York, as chairman, and J. T. Callahan, of the Archer Rubber Co., Milford, Massachusetts, as vice-chairman. At the meeting of the clothing division in the afternoon, N. Lincoln Greene, of the United States Rubber Co., Boston, was reelected chairman, and William H. Tenney, of the Clifton Manufacturing Co., Boston, as vice-chairman.

All of the district managers for the Grow Tire Co., Canton Junction, Massachusetts, in the larger New England cities were recently guests of the company at a dinner in the Copley Square Hotel, Boston, about fifty persons being present. It was given primarily to celebrate the inception of the Grow tire idea five years ago. In his address, George Grow, president of the company, stated his belief that the company's business would be larger this year than last. The factory is now running two shifts, a day and a night force with orders booked to insure operation at capacity for many months. He also announced that the factory will be enlarged immediately to make available some 16,500 feet of floor space for manufacturing purposes.

GENERAL MANAGER OF THE WILSON RUBBER CO.

FRED J. WILSON, whose long and comprehensive experience in rubber goods manufacture is responsible for the remarkable success of the Wilson Rubber Co., Canton, Ohio, was born in Galion, Ohio, in 1877 and educated in the public schools of Akron, Ohio.

FRED J. WILSON

His first employment was with The B. F. Goodrich Co., where he was foreman of the molded goods department for eight years, going in 1903 to the Republic Rubber Co., Youngstown, Ohio, for one year. In 1904 he went as foreman to the Canton Rubber Co., Canton, Ohio, with which firm he remained until July, 1916, except for one year with the Faultless Rubber Co., Ashland, Ohio, in charge of molded goods. His return to the Canton Rubber Co. was as superintendent, and in July, 1916, he organized the Wilson Rubber Co., of which he was elected vice-president and general manager, which position he now holds.

Under Mr. Wilson's management the company has become the largest exclusive rubber glove manufacturing concern in the country, and a large three-story plant extension to increase production is nearing completion.

Mr. Wilson is a member of The Rubber Association of America, Inc., the Rotary Club, Adcraft Club and the Canton Transportation Club.

THE RUBBER TRADE IN OHIO

By Our Regular Correspondent

AKRON NOTES

THE SITUATION in the retail tire business was brought out at a recent meeting of one of the larger companies in Akron at which discussion of trade and sales methods gradually developed the facts in the new situation.

The retail sale of tires has undergone a revolution during the past three years which has placed tires in country blacksmith shops, country drug stores and general stores in addition to the garages and dealers to which the retail trade was confined previous to the war. Men who have sold tires from three to fifteen years, many of them actual pioneers in the business, assert that previous to the war the tire dealers were closely connected with the automotive industry and that tire salesmen seldom met men selling tires on the road. Today, however, it is not unusual for a man to walk into a small town tire dealer's place of business in the afternoon and find that no less than eight or ten men have been in to see the dealer during the early part of the day. Lines as to who shall handle tires have completely broken down. The general storekeeper, the drug store, and in some instances even banks have become tire agencies, and the result has been that the shoddy tire which was formerly kept out of the market because the men who dealt in tires had reputations to work up or maintain have now become one of the "staple" lines sold in many small communities.

Many of the small tire companies which were organized primarily for stock selling purposes have actually entered production to some extent, and knowing that they do not intend to stay in the business for any length of time have made every effort to sell their inferior product. The old-time dealers, of course, refused to take on the agencies for their product, knowing good tires and the necessity of giving automobile owners the value of their money, and the salesmen of this class of goods worked upon the desire for profits, regardless of service, of many of the merchants of small towns, and succeeded in having them take over the sale of their product.

The Akron Chamber of Commerce has entered a free balloon, "The City of Akron," in the national balloon races to start from Birmingham, Alabama, May 21. W. T. Van Orman, well-known Akron flyer, and Willard Seiberling will be in the cage of the Akron car. The balloon was built for the national races in 1918 when it was flown for the Akron flying club. Every Akron balloon flown in national meets, with the exception of one, has taken either first or third places and the Akron balloon which won the national race in 1914 also won the international race. Ralph Upson, formerly with The Goodyear Tire & Rubber Co., flew the international winner.

W. W. Hall, traffic commissioner of the Chamber of Commerce, recently placed in charge of the Akron bureau of the United States Department of Commerce, is making wide plans to have the smaller Akron manufacturing companies of all lines, including the rubber factories, represented at the International Foreign Trade Convention in Cleveland, Ohio, May 4 to 7. The larger companies will be represented by their foreign department managers and assistants, but heretofore the smaller companies have paid little attention to export business, feeling that they are able to sell their product in this country.

The Akron Home Owners' Investment Co., formed by the rubber men and other manufacturers of Akron two years ago to help solve the housing shortage and obtain homes for families who had saved some money, but were unable to finance their home building desires through banks and building and loan associations, has closed its business after building 450 homes. The company has received several bids for the collection business which alone remains and indications are that before another month the company will be entirely out of business. H. S. Firestone, president of the

Firestone Tire & Rubber Co., was president of the company. Stock holdings amounted to more than $2,500,000, and the money will be refunded to the stockholders as rapidly as payments are collected from the owners of the homes.

More than sixty Akron business men, representing every line of industry, with a good number of rubber men, made the first trade extension trip to the communities west of Akron on April 14. The delegation went on a special train to five small towns, the farthest away being 68 miles west of the city. J. B. Huber, president of the Chamber of Commerce, originated the idea. Crannell Morgan, of the Hardware & Supply Co., was chairman of the committee which made arrangements for the trip.

When delays in collecting taxes made it impossible to compel payment in March, The B. F. Goodrich Co. was one of the large companies which responded to appeals for assistance by paying taxes amounting to almost one-quarter of a million dollars, when under the law payment could have been deferred until June. The officials of the company, however, were shown the dire need in which the city and county would find itself if the large taxpayers held up their payments any longer and responded quickly.

Lee R. Miller, who with his brother Harvey and Jacob Pfeiffer, organized The Miller Rubber Co. 26 years ago, has organized a new company with a capital of $50,000 to manufacture surgical rubber gloves at Cuyahoga Falls, Ohio. The new corporation is known as the Surgeon Rubber Glove Co. Plans regarding building and production have not yet been announced, but the new company is being watched with interest by rubber men who wonder whether the future will see the $50,000 company expand into another Miiler plant within the next few years. Mr. Miller was instrumental in starting production of the standard rubber glove by the Miller company. Recently this department was sold to a Cleveland concern. Associated with Mr. Miller in the new project are H. C. Osborne, C. N. Snook, J. P. Carney and L. J. Miller.

The Mason Tire & Rubber Co. has paid in common and preferred dividends more than $1,000,000 since its organization in 1915, according to official announcement by the company, accompanying declaration of the regular quarterly dividend on the preferred stock on April 1.

H. G. Wilson, formerly editor of the *Goodyear Tire News*, is now connected with the *Firestone Non-Skid*. The *Goodyear Tire News* has been temporarily discontinued.

W. T. Behoteguy, for the past ten years manager of The Goodyear Tire & Rubber Co.'s automobile tire sales, has been placed in charge of company tire sales, to succeed W. G. Palmer, who has retired because of ill health. Mr. Behoteguy is succeeded by Fred L. Morgan, who for the past ten years has been in charge of the Cleveland branch of the company sales department. C. W. Santee has been placed in charge of the reorganized sales department of The Goodyear Tire & Rubber Co. Under Mr. Santee will be R. W. Clark, sales promotion department manager; W. H. Sorn, service department manager; P. R. Baugh, dealer development manager; H. H. Tolman, government sales division manager; C. A. Reed, manager of stock clearance division, and A. R. Kooh, who will continue to lecture on farm field work.

L. M. Barton, who resigned from the publicity department of The B. F. Goodrich Co. a year ago, has been named sales manager of the Republic Tire & Rubber Co., of Youngstown and Canton, Ohio.

The affairs of the Interlocking Tire & Rubber Co., which recently ended disastrously in a receivership, remain in the same condition in which they were reported a month ago. The stockholders, working through a committee, have raised $50,000 to take over the operation of the plant, but thus far neither the receiver nor the court under which he is holding the company property have felt it wise to turn the plant over to the stockholders' committee. Meetings are being held weekly with the view of placing the company back on its feet financially.

With the increased interest shown by Akron manufacturers in foreign trade, the remarks of Bertram G. Work, president of The B. F. Goodrich Co., upon his return from his annual visit to Germany and France, were of even greater importance this year than heretofore. In Germany the industrial conditions and food supply have shown improvement over the past year and the spirit of the people has changed for the better, Mr. Work said. Prices of meat remain very high in Germany, although supplies were sufficiently large to warrant the abrogation of the meat restriction last November. From the social standpoint France has improved, Mr. Work said, but business is bad. The motor industry has been hard hit. With gasoline at 80 cents a gallon, economy can naturally be expected. But the last two months have shown signs of improvement. Bankers reflect this better condition of business.

The mute colony of Akron, which at the peak contained 3,000 men and women, has practically disappeared. With the general lay-off of men the mutes returned to their homes. They expressed the desire, however, to return to Akron when business conditions made it possible to obtain work. The mutes were found to be very skillful and efficient workers.

The Board of Education has honored the Seiberling family for its loyalty to Akron and interest in public questions by naming the $1,000,000 high school building to be erected in Goodyear Heights, the company home site allotment, for the Seiberling family. Bonds for the school have been sold. The land upon which the school is to be built was donated by F. A. Seiberling, president of the Goodyear Tire & Rubber Co. The plans for the building are along lines approved by Mr. Seiberling and the building will be one of the most modern in the country.

Two men were killed and four others injured in an explosion at The Miller Rubber Co. cement house April 12. The cause of the explosion has not been determined, although William Pfeiffer, secretary and treasurer of the company, has made a personal investigation. The explosion broke hundreds of windows in the main plant, but the general material damage was small.

Plans for building a manor house on the Portage Country Club grounds, to replace the club house partially destroyed by fire two months ago, have been completed. The total cost of the buildings has not been announced. The former club house was the center of much of the social activity of the rubber men in Akron.

W. W. Hall, foreign trade director of the Chamber of Commerce, and E. E. Titus, export manager of The B. F. Goodrich Co., a member of the Chamber's foreign trade committee, have been honored by important appointments at the International Trade Conference to be held in Cleveland, Ohio, May 4 to 7. Mr. Titus has been named a member of the special advisory committee which is to assist beginners in the export field, and Mr. Hall has been named secretary of the motion picture group, which will study motion pictures in connection with foreign trade development.

At the recent annual stockholders' meeting of The India Tire & Rubber Co., Akron, the same officers were reelected. They are: J. M. Aldefer, president; J. K. William, vice-president; D. A. Grubb, secretary and P. C. Searless, treasurer.

The Mohawk Rubber Company, Akron, manufacture a complete line of odd size casings and tubes, as follows:

31x3½ N. S. Cl.	37x4½ N. S. S. S. and Q. D.
34x3½ N. S. S. S. and Q. D.	36x5 N. S. Q. D. and Cl.
35x4 N. S. S. S. and Q. D.	36x5½ N. S. Cl.
36x4 N. S. S. S. and Q. D.	37x5½ N. S. Q. D.
	38x5½ N. S. Q. D.

NEW HOME FOR AKRON ADVERTISING AGENCY CO.

The Akron Advertising Agency Co. has acquired its own building at 115 South Union street, in the residential section of Akron. Improved business and staff additions necessitated removal into larger quarters. When built this residence was the finest and

largest in the city. It is surrounded by spacious lawns and well-kept shrubbery. The old-fashioned building with large, high-ceilinged rooms and numerous windows necessitated few alterations to fulfill the purposes of the new tenants.

The private office of the president, Gordon Cook, the space buyer's office and the administrative and production offices, including accounting, mechanical, checking, filing and forwarding departments, are located on the first floor. The entire second floor is occupied by the creative branches of the agency's work, including the private office of vice-president Edward S. Babcox, and the service and copy departments, and each account supervisor has his own private office. The art director and his staff take advantage of the exceptionally good lighting on the third floor.

Being close to the activities of the city, yet away from the noise and distractions of a busy office building, the new quarters are particularly well adapted to the needs of the agency, tending to still greater improve the service rendered clients.

CLEVELAND

Otis Cook, formerly sales manager of the Kelly-Springfield Tire Co., has acquired an interest in the Howe Rubber Co., New Brunswick, New Jersey. McCook was elected vice-president and general sales manager of the company on April 19 and will have his headquarters in Cleveland. Associated with him will be H. H. Grobe, formerly of the Kelly-Springfield sales organization.

The Automotive Industry Convention will be held in Cleveland May 4—7 inclusive. The program for this Eighth National Foreign Trade Convention has been outlined and is quite constructive in its scope. The general theme is "American Foreign Trade and Its Present Problems."

The Columbia Products Co., agricultural and industrial chemicals, including whiting for the rubber trade, has removed from 1012 National City Building to 623 Union Building, 1836 Euclid avenue, Cleveland.

MISCELLANEOUS OHIO NOTES

L. M. Barton, who has been appointed manager of pneumatic tire sales of The Republic Rubber Co., Youngstown, came to the company in 1920, after five years with The B. F. Goodrich Co., Akron, first as a member of the advertising staff, then for several years as special representative of the executive committee. In 1919, he took charge of the dealers' specialization department of the Goodrich company's tire sales division. Having spent five years as an automobile, accessory and tire distributer in Iowa, he has a wide acquaintance among the automotive trade throughout the Middle West.

E. F. Jones has resigned as president of The Republic Rubber Co., Youngstown. He was with the Republic for a little over a year, coming to them from Worcester, Massachusetts, where he was an officer in the Morgan Wire & Spring Co., to which he has now returned. Until his successor is appointed William Wilms, chairman of the board of directors, will assume the management of the Republic company.

The Wooster Rubber Co., Wooster, Ohio, manufactures exclusively "Artcraft" toy balloons, from small airweight sizes up to its famous "Giant," which inflates to 50 inches in diameter, all in assorted colors. It also manufactures the popular airship balloons in assorted colors and in all sizes and weights.

The Ashland Tire & Rubber Co., Ashland, Ohio, has built its factory consisting of a main building, powerhouse, reclaiming plant and a transformer house. The main building is 200 by 125 feet, one floor and basement, with a floor space of 45,000 square feet. The buildings are modernly equipped throughout and the factory has a capacity of 1,000 tires and 1,500 tubes per day. Operations were commenced February 24 and the approximate production is 300 tires per day. The company manufactures high-grade cord and fabric tires; also a special brand tire. Since commencing operations sales connections have been made in all the principal cities of the East and Middle West.

At the second annual meeting of the stockholders, the following directors were elected: George Hildebrand, Judge F. N. Patterson, F. L. Fickel, G. C. Weyher, A. A. Fickel, W. H. Roberts, T. T. Elliott, and H. C. Bate. At the directors' meeting following the same, officers were elected, as follows: Jacob Fickel, president; G. C. Weyher, vice-president; A. A. Fickel, secretary and treasurer; W. H. Roberts, second vice-president; T. T. Elliott, assistant treasurer; H. C. Bate, assistant secretary.

The Barr Rubber Products Co., Lorain, manufacturers of high grade toy balloons having absolutely fast colors, states that its factory has been running continually for the past year, at no time having been closed down.

Francis Gaskins has been appointed general manager of The Avon Tire & Supply Co., Cincinnati, which claims to be the largest company of its kind in the state. Because of his proven ability as an executive and his success in handling men, Mr. Gaskins was chosen for this position.

J. C. Kearns has been appointed acting sales manager of The Republic Rubber Co., Youngstown, to fill the vacancy made by the resignation of H. J. Woodward, vice-president, in charge of sales. Mr. Kearns is one of the oldest employes of the company, starting in the sales department in 1907, then New York traveling salesman; manager of the Boston branch, and after three years' service was given the more important post of manager of the Detroit branch.

J. C. KEARNS

In 1914 Mr. Kearns was made traveling auditor and occupied this position until 1916, when he was called to Youngstown and made assistant manager of mechanical goods sales. In December of last year he was further advanced to manager of mechanical goods sales department and following his appointment last week as acting sales manager he now becomes head of the entire Republic sales organization.

Mr. Kearns was born and has spent much of his life in Youngstown where he has made a wide circle of friends. Through his years of service with The Republic Rubber Corporation he has doubtless carried the name "Youngstown, Ohio" into more places throughout the United States than has any other salesman calling Youngstown his home.

EVERY MOTOR A TUBE VULCANIZER

The B. F. Goodrich Co., makes the surprising announcement that every automobile carries an excellent tube vulcanizer, which has been proven by ingenious motorists, who, when miles away from anywhere, find a tube in need of patching. The hot radiator is a very satisfactory vulcanizer for inner tubes, and can be used to advantage. A little vulcanizing cement is smeared on the rubber patch and around the hole in the tube and then the two are put together, placed patch downward on the radiator and held firmly with the pressure of the hand until the rubber is cured. If no vulcanizing cement is at hand a little tube rubber dissolved in gasoline may be used as a substitute.

PRESIDENT OF THE MASON TIRE & RUBBER CO.

OWEN MERIDETH MASON, president of The Mason Tire & Rubber Co., Kent, Ohio, and also president of The Mason Rubber Plantations Co., was born in Carrollton, Kentucky, and received his education in the public schools of Des Moines, Iowa.

OWEN M. MASON

His first venture into business was as a bond salesman in Chicago, Illinois. In 1915, with the assistance of his brother, D. M. Mason, treasurer and general manager of The Mason Tire & Rubber Co., Kent, Ohio, he organized the investment security house of Mason Brothers in Cleveland, Ohio, following this by the organization of The Mason Tire & Rubber Co., The Mason Cotton Fabrics Co. (since absorbed by the tire company) and The Mason Rubber Plantations Co.

During the past year he visited Singapore in the interests of The Mason Rubber Plantations Co.

Mr. Mason is a director in The Mason Tire & Rubber Co., director in The Mason Rubber Plantations Co., and a member of the firm of Mason Bros., Cleveland, Ohio.

He is a member of the Masonic Lodge, Cleveland, Ohio, Chamber of Commerce, Kent Board of Trade, and Willowick Country Club, Wickliffe, Ohio.

UNDERWRITERS' LABORATORIES TEST

The Underwriters' Laboratories, 207 East Ohio Street, Chicago, Illinois, chemically tests the rubber lining of fire hose and rubber-covered wire to show the grade of material used, and also conducts from 300 to 500 physical tests a month, including tensile, elongation, and recovery. These are mainly counter-checks on the work of the Laboratories' inspecting engineers at factories. Samples are obtained on the market, from factories, and in the field from lots of wire and hose bearing Underwriters' Laboratories serially numbered labels.

TESTING RUBBER AT THE UNDERWRITERS' LABORATORIES

In the illustration at the right muffle-furnaces may be seen for determining the ash in rubber-lined fire hose and rubber-covered wire. In a compartment below each furnace the hot junction of a thermo couple is available for measuring and controlling the temperature at which the test is conducted. The cold end of the couples is connected to an automatic recording pyrometer mounted in an adjoining room. The chemist at the left is separating some of the ingredients of a rubber compound, while the one in the center is conducting a fusion in a silver crucible, to determine the percentage of sulphur in rubber.

THE RUBBER TRADE IN THE MID-WEST

By Our Regular Correspondent

THE MID-WEST RUBBER MANUFACTURERS' ASSOCIATION

THE MID-WEST RUBBER MANUFACTURERS' ASSOCIATION held a luncheon at the Chicago Athletic Association, April 12, 1921, presided over by President D. M. Mason. Forty-four members attended. The "get together spirit" was a feature of the meeting. President Mason read telegrams of regrets of absence from members unable to attend. Some of the associate members made interesting talks and furnished some valuable forecasts of business trend.

Frederick Merritt, of the *India Rubber Review*, gave the last minute rubber news.

W. L. Burgess, of the Surety Tire & Rubber Co., St. Louis, Missouri, stated that although in the far southwest, trade improvement is not very large, the St. Louis district shows a splendid increase and his factory is operating four nights a week overtime.

Paul Bloom of Fred Stern & Co., Chicago, Illinois, said rubber is going up a little in price and a firmer market is expected by May 1.

Edward T. Meyer of F. R. Henderson & Co., New York, New York, advised that imports of rubber will increase in April, that rubber in New York was in strong hands which stimulates the market and dealers in both Singapore and New York are holding their stocks.

C. F. H. Johnson of Brighton Mills, Passaic, New Jersey, stated that mill shipments of fabrics were increasing and demand becoming greater.

W. F. Harrah, of the National-Standard Co., Niles, Michigan, is of the opinion that the tide of business is improving and that we are on the threshold of extraordinary prosperity.

The directors' meeting was well attended and many important matters discussed. After May 1, the association offices will be Nos. 1534 and 1535, on the fifteenth floor of the McCormick Building, 332 South Michigan avenue, Chicago, Illinois.

The next regular monthly meeting of the Mid-West Rubber Manufacturers' Association will be held at the Chicago Athletic Association, 12 South Michigan avenue, Chicago, Illinois, on Tuesday, May 10, 1921.

MISCELLANEOUS MIDWESTERN NOTES

The Federal Rubber Co., Cudahy, Wisconsin, announces that production has gone steadily forward and since April 1 all departments have been actively engaged five days a week. A. A. Frank, factory manager, has informed the workers that under the present rate of increase of production a full time week will shortly be had throughout the entire plant.

Arthur E. Swanson, formerly of the Firestone Tire & Rubber Co., Akron, has associated himself with A. W. T. Ogilvie, Chicago, in the Swanson Ogilvie Co., 1545 First National Bank Building, Chicago, industrial engineers. This organization expects to specialize to a considerable extent in the rubber industry because of Mr. Swanson's special experience in that field. A branch office has also been opened in Akron, Ohio.

The Security Rubber & Belting Co., 2837 South La Salle street, Chicago, has been organized by Harry E. Dennie and James W. Mowrey, formerly of the Imperial Belting Co., to handle a complete line of mechanical rubber goods. Mr. Dennie

has been connected with the rubber and belting industries for 25 years and Mr. Mowrey for about 20 years, while both are very well known among jobbers and dealers throughout the country. With the intention to handle only quality products and backed by years of experience, they are hopeful of quickly establishing a reputation for their products.

J. C. Finck Mineral Milling Co. and the Nulsen Corporation are consolidated under the name "National Pigments & Chemical Co." with headquarters at Levee and Sydney streets, St. Louis, Missouri.

R. W. Smith was recently elected secretary of the Milwaukee Tire Dealers' Association, 142 Oneida street, Milwaukee, Wisconsin.

The Wildman Rubber Co., Bay City, Michigan, advises that they will let the contract for their new factory at Bay City within the next thirty days. The main structure will be 365 by 160 feet, three stories and basement, of reinforced concrete construction. The total cost, including power plant and office building, will be approximately $1,250,000. All the excavating and the concrete footers have been completed. The company hopes to have the new plant in operation the latter part of September.

The Hawkeye Tire & Rubber Co., Des Moines, Iowa, announce the officers of their company as follows: J. T. Christie, president and treasurer, and John Frederick, vice-president.

The American Insulated Wire & Cable Co., 954 West 21st street, Chicago, Illinois, are preparing plans to remodel a one-story plant, 198 by 200 feet, at the northeast corner of 22nd and Fisk streets, to cost $100,000. The equipment will involve an outlay of $200,000.

The Jefferson Rubber Co., Jefferson, Wisconsin, made the first shipment of tires and tubes from its new factory about the middle of March and is now in position to make daily deliveries of 125 tires, including both cord and fabric, and of 300 red and gray tubes. The company reports a good volume of future business booked and hopes the rubber industry generally "will be as bothered with business" as it is.

THE RUBBER TRADE ON THE PACIFIC COAST

By Our Regular Correspondent

A CHEERFUL TONE is heard among the rubber manufacturers and the larger distributers of rubber goods on the Pacific Coast, and preparations are being made for a brisk spring business and probably a lively trade during the remainder of the year. The buyers' strike did not perceptibly affect far west makers and dealers in rubber goods. If trade halted, it was rather because dealers were temporarily overstocked than because retail purchasers were delaying orders in the hope of effecting a price drop. Generally speaking, prices on rubber goods have not been much above pre-war prices, despite increased costs of production. Goods for which there is reported an especially increased inquiry include hose, belting, cement, matting, packing, tires and tubes.

The spring trade has been coming along strong and the industry is fast nearing normalcy. Factory extensions temporarily postponed are now being actively undertaken; and the number of unemployed rubber workers is rapidly decreasing. With returning activity in the industry, several new rubber companies have recently been organized, and projects long dormant are being revived.

SAN FRANCISCO AND VICINITY

George S. Towne, vice-president and general manager of the Pioneer Rubber Mills, Pittsburg, Contra Costa County, California, has been in the southern part of the state studying conditions, which are said to be uncommonly good, so far as the Pioneer Mills are concerned. Full time and much overtime in some departments has been the rule all winter at the Pioneer works. The company has just completed a full-molded hose unit and is planning to add other sections in the future.

J. D. Pasha, who has been in the tire business ten years and was for four years general sales manager of The Portage Rubber Co., Barberton, Ohio, has been appointed general sales manager of the new Coast Tire & Rubber Co., Oakland, California. The factory has established a sales force in all the west coast states, and its first unit is prepared to turn out 1.500 tires and 2,000 tubes daily.

Ray Willis, for three years sales manager in the Southern States for the Hood Tire Co., Watertown, Massachusetts, has succeeded L. B. Tichenor as district manager for the Hood concern in San Francisco. He has already begun to increase the sales force.

The California Rubber Co., a new $5,000,000 corporation, will build the first unit of its plant at Alameda where tires, tubes, and other rubber goods will be manufactured and 700 men employed on an eight-hour shift.

LOS ANGELES AND VICINITY

That The Goodyear Tire & Rubber Company of California has 7,907 accredited service stations in twelve western states, and that up to the beginning of its present fiscal year it had sold 493,000 tires of all kinds and 495,000 tubes, was some of the information imparted by A. F. Osterloh, vice-president and general manager, at the second annual meeting of the stockholders, held on March 3. He stated that the company was then producing 700 tires a day, but felt sure that with improving business conditions the output would be increased to 1,000 tires a day in April. Mr. Osterloh stated that the combined business of the Akron and the California companies for January, 1921, was $9,000,000. The company wrote off an inventory loss of $600,000 representing depreciated values of raw materials, paid $400,000 in dividends, and yet showed a deficit of but $28,000 for the year.

The Goodyear stockholders elected as directors: J. E. Jardine, H. H. Fair, L. A. Phillips, F. A. Seiberling, A. F. Osterloh, C. C. Slusser, W. A. M. Vaughan, J. R. Reilly and J. S. Willaman. The directors chose these officers: F. A. Seiberling, president; A. F. Osterloh, vice-president and general manager; W. A. M. Vaughan, secretary and treasurer; D. J. Koonce, assistant treasurer.

After ten years' connection with The B. F. Goodrich Rubber Co. in San Francisco and twenty-seven years' experience in the rubber trade, Robert J. McNeilly, one of the best-known rubber men on the coast, has been promoted to the post of branch manager for the company in Los Angeles with a territory including all of southern California south of Mt. Tehachepi, all of Arizona, and the western part of New Mexico. For the same company and territory Frank L. Ryan, formerly manager of the Goodrich Sacramento branch, has been appointed tire sales manager. The company does a large business in pneumatic and solid tires and a wide variety of mechanical rubber goods in the Southwest, and its branches will deal wholly with wholesale buyers.

H. A. Farr, assistant to J. B. Brady, manager of the western division of the United States Rubber Co., and who is head of the company's tire division on the coast, has been visiting J. B. Magee, manager of the company's southern California and Arizona branches, in Los Angeles. Mr. Farr and Mr. Magee have been studying conditions in southern California and Arizona and they declare that the trade prospects are very encouraging. Especially notable is a steadily

growing depletion of accumulated tire stocks in the Southwest.

W. V. Goar, who occupied a similar position in Seattle for the Pennsylvania Rubber Co., Jeannette, Pennsylvania, has been promoted to take charge of sales at the Los Angeles branch, 950 South Main street, succeeding H. C. Edelman, resigned. F. J. Ritchie is office manager. The branch will specialize in vacuum non-skid tires.

Brimfield & Ashton, formerly of Egg Harbor City, New Jersey, have bought the business of the Voight Rubber Co., 722 East Colorado street, Pasadena, and under the name of the Ashton Rubber Co. will specialize in Fisk tires and tubes.

"A decidedly improving tendency in trade," is reported by Nelson & Price, 1056 South Olive street, one of the largest tire distributers in Los Angeles. Mr. Price is president of the Los Angeles Tire Dealers' Association.

F. C. Howland, 6680 Hollywood Boulevard, Hollywood, one of the pioneer tire dealers in that section of Los Angeles, has taken the agency for Hartford tires.

The Westport Tire Co., large dealers in tires and tubes, has removed from San Francisco to Los Angeles.

C. R. Prentice, formerly secretary of the West American Rubber Co., has started the Cushion Pedal Co., and will deal in rubber automatic accessories.

Guasti, House & Giulii have been appointed sole truck tire distributers for Los Angeles, including Hollywood, by the Kelly-Springfield Tire Co.

Thermoid tires and tubes will be distributed by the Maxon Tire Co. in its new quarters at Main and South Tenth streets, Los Angeles.

The Mechanical Rubber Co., 5411 South Hoover street, Los Angeles, specializes in patented novelties and experimental work, making rubber heels and soles, plumbers' supplies, and various kinds of mechanical rubber goods. The active factors are Thomas J. Hill, president; T. Kirk Hill, secretary, and W. P. Heickert.

Lee tires will be handled in Los Angeles by E. Bruce Conlee in cooperation with Chanslor & Lyon, which firm has had the agency for several years.

A new monthly shipping service between Los Angeles and the Orient, touching at Singapore and Javanese ports, has just been started.

The Elaterite Varnish & Rubber Co., 55th and Alameda streets, Los Angeles, maker of elaterite mineral rubber, which is sold to rubber manufacturers in the East and Mid-West, is a California corporation with $2,500,000 capital. C. H. Judd is president; John B. Brokaw, vice-president; and D. H. McDonald, secretary and general manager.

Fay A. Bates, a Los Angeles tire worker in the Goodyear plant, recently broke all records, it is claimed, for finishing tires, having completed 112 double-molded clincher tires in eight hours.

Operations have begun in the new plant of the West Coast Asbestos Co. at Downey, California, that was started last fall. Associated with the original promoters, E. M. and W. G. Smith, rubber manufacturers of Los Angeles, is the United States Asbestos Co. of Manheim, Pennsylvania, one of the largest producers of asbestos goods in America. The capital stock will be increased to $600,000 and the originally planned output doubled. Asbestos-rubber belting, high-pressure packing, brake linings, gaskets, valve-stem packings, etc., will be manufactured. The spinning and weaving mill will consume 8,000 pounds of asbestos yarn daily, the raw material being brought from Canada, Arizona, and Southern California. It is said to be the only asbestos mill west of Chicago.

F. C. Harris, formerly of the San Francisco branch of the Kelly-Springfield Tire Co., has been appointed manager of the Los Angeles branch, succeeding G. J. Brooks, who has been put in charge of the San Francisco branch.

It is rumored that a large Ohio rubber concern will soon establish a factory on an 88-acre tract adjoining the Southern Pacific Railway between Glendale and Burbank. It is stated that a tire factory will be erected first, then a rubber reclaiming plant, and finally a fabric mill.

NORTHWESTERN NOTES

O. O. Gooch, for seven years a representative of the United States Rubber Co. in Portland, Oregon, has been appointed sales manager for the Oregon territory by the Howell-Swift Tire Co., makers of Mystic tires.

To serve its steadily growing trade, the Puritan Rubber Co., of Yakima, Washington, is planning to establish a chain of eight factory units on the Pacific Coast.

CANADIAN NOTES

THE ANNUAL FINANCIAL STATEMENT of the Ames Holden McCready Co., Limited, for the year 1920, includes tire sales of $224,313; felt sales $151,194, and shoe sales $6,514,552. Sales of shoes for the previous year were $6,658,263. The figures showed a deficit of $46,542 on tires, $7,227 on felts, and $639,836 on shoes. The felt plant was not in operation until August last, although sufficient orders were on the books to keep the plant in full operation up to that time. Orders filled during the last months of the year showed insufficient profit to provide for a surplus, as stated. The report states that the mild winter was not conducive to good buying, but that the demand was showing up well.

After all deductions, the net loss in 1920, and three quarterly preferred dividends, the deficit for the year totaled $639,836, against a surplus of $176,150 in the previous statement, and $323,322 in 1918-1919. The position as to working capital was reduced to $551,513, a decline in the year of approximately two millions. Inventories were lowered by upwards of $600,000 at the end of 1920, aggregating $3,396,824, as against over $4,000,000 in 1919.

The earnings of the Canadian Westinghouse Company, Limited, for the last year totaled $1,251,080, and the net profits $916,080, as shown in the report presented at the annual meeting held March 29, 1921, at Hamilton, Ontario,

During the year the outstanding capital stock was increased from $6,229,400 to $7,417,900 by the issuance of 11,885 new shares.

The Gregory Tire & Rubber Co., Ltd., Vancouver, British Columbia, incorporated under the laws of that province with a capital of $1,500,000 to manufacture tires, tubes and accessories, has now commenced manufacturing, the capacity to be five hundred tires and 1,000 tubes a day. Morton Gregory, a chemist of considerable experience, is president and managing director; A. B. Weeks is vice-president; S. A. Madge is treasurer, and Frank Parsons is secretary. R. O. Kellogg, superintendent, was formerly superintendent of the American Tire & Rubber Co.; F. B. Roesel is foreman of the tire construction department; Martin Nelson, foreman of the mill and calender department, and W. T. Simpson, foreman of the tube and accessory department. The main building is of reinforced concrete construction, 70 by 180 feet, two stories and basement. Modern machinery to the value of about $150,000 has been installed.

The Goodyear Tire & Rubber Co. of Canada, Limited, has asked permission of the Ontario legislature to permit reorganization of the Canadian company by reducing the capital stock of the company from $100 to $10 per share and to permit the issuance of prior preference stock to take care of various liabilities. Note holders, whose claims aggregate $1,219,920, are to receive three-year eight-per cent notes. Rubber commitment creditors are to

receive 20 per cent in cash on deliveries and the balance in seven per cent 90-day notes. Fabric creditors will receive 25 per cent in prior preference stock or preferred stock at par and 75 per cent in cash. The $3,000,000 owed to the parent Goodyear company will be paid in prior preference stock at par. The company under refinancing plans is to meet all obligations by September 30, 1921. The company's bank borrowing exceeds $1,000,000; notes due in the United States amount to $1,219,920; rubber liabilities aggregate $684,000, and fabric liabilities, $4,800,000.

The Harry M. Hope Engineering Co., 185 Devonshire street, Boston, has established offices in the Dominion Express Building, Montreal, Quebec, to handle its Canadian business. The Canadian manager is George W. Saunders, formerly connected with S. Pearson & Sons, London.

STATEMENT OF THE INDIA RUBBER WORLD

Statement of the ownership, management, etc., required by the Act of Congress of August 24, 1912, of THE INDIA RUBBER WORLD, published monthly at New York, N. Y., for April 1, 1921.

State of New York, } ss.:
County of New York, }

Before me, a notary public in and for the State and county aforesaid, personally appeared E. M. Hoag, who, having been duly sworn according to law, deposes and says that she is the business manager of THE INDIA RUBBER WORLD, and that the following is, to the best of her knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:

Publisher, The India Rubber Publishing Co., 25 West Forty-fifth street, New York City.

Editor, Henry C. Pearson, 25 West Forty-fifth street, New York City.

Managing Editor, Henry C. Pearson, 25 West Forty-fifth street, New York City.

Business Manager, E. M. Hoag, 25 West Forty-fifth street, New York City.

2. That the owners are: (Give names and addresses of individual owners, or, if a corporation, give its name and the names and addresses of stockholders owning or holding 1 per cent or more of the total amount of stock.)

The India Rubber Publishing Co., 25 West Forty-fifth street, New York City.

Henry C. Pearson, 25 West Forty-fifth street, New York City.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given, also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by her.

E. M. HOAG, Business Manager.

Sworn to and subscribed before me this 31st day of March, 1921.
(Seal) FREDK. SPRENGER,
Notary Public, Westchester County.

New York County Clerk No. 188. Register's No. 2210. Certificate filed in New York County. My commission expires March 30, 1922.

ANOTHER GOOD ROADS ESSAY CONTEST

In the presence of members of the Highway and Highway Transport Education Committee and Harvey S. Firestone, President Warren G. Harding complied with a request of the committee and on the White House lawn recently presented Miss Katherine F. Butterfield of Weiser, Idaho, with a certificate that entitled her to a university scholarship. Of more than 200,000 high school contestants for the best 500-word essay written on the problem of good roads in the Ship-by-Truck—Good Roads essay contest, Miss Butterfield was chosen the winner.

At the ceremonies the announcement was made that the Highway Transport Committee will sponsor a second competition for the Harvey S. Firestone prize, a four-year scholarship, including expenses, to the high school student writing the best essay on a subject pertaining to good roads.

The rules of the contest, which last year were conducted by the Ship-by-Truck Bureau, which Mr. Firestone founded, will be virtually the same as in 1920. All high school students are eligible to compete, essays must be not more than 500 words in length and must be in the hands of the local committees not later than May 31. While no other major prizes have been announced, local and state prizes are expected.

A PIONEER IN BALATA AND RUBBER

BALATA MEN in the Guianas and in New York were once well acquainted with W. A. Joubert, who cruised for and discovered many valuable reefs in British and Dutch Guiana. So well known was he in the lines mentioned and in Mexican rubber that a sketch of his war activities is very interesting.

W. A. JOUBERT

Mr. Joubert knows Mexico and its rubber possibilities intimately. His plans for establishing a large and profitable business there had just matured when they were dealt a rude blow in 1913 by Mexico's internecine difficulties, and, forced to relinquish everything, he returned home almost penniless. Under contract, he spent 1914 and 1915 lecturing on "The Mexican Situation," addressing many distinguished gatherings, and wrote magazine articles on the subject, that were widely noted. On the outbreak of the World War, finding himself without resources, he bravely took a factory job as a "helper" and, as he says, "revelled a year in jeans and grease" with war-time wages. He combated enemy propaganda, notably in "Neighbor Hans," which, after a long magazine run, was used as a war document by the Morgan Liberty Loan Committee. Mr. Joubert also figured as a public speaker for the loans.

From Liberty Loan work he was transferred to the National Service Section of the United States Shipping Board, making many telling speeches for the Allied cause. In one case he prevailed upon the employes of eight munition works to abandon a projected strike and to stay loyally at their tasks. Next he was assigned to the United States Aircraft Production Bureau but finding the work uncongenial he sought a Y. M. C. A. post in France. The signing of the armistice, however, put an abrupt end to all his war activities. Since then he has been in the employ of a prominent New York investment house, in which position he has "made good" where many had failed; and with his wife and daughter now lives at Newburgh, New York.

Mr. Joubert has a son, Gordon, who, while in the Canadian service, was shell-shocked at Ypres, and is in business in Saskatchewan. Another son, Clement, who was in the United States aviation service, is managing a sugar plantation in Cuba.

MINNEAPOLIS RETAINS AND FURTHER SUBSTANTIATES ITS RIGHT to the title "Billion Dollar Market" in figures compiled by the wholesale and jobbers' section of that city's Civic and Commerce Association. Trade in belting and rubber goods totalled $7,500,000 in 1919 and increased to $9,687,500 in 1920. This is exclusive of rubber footwear which is included in the city's $9,000,000 trade in boots, shoes and rubbers.

Activities of The Rubber Association of America

MEETINGS

THE TECHNICAL COMMITTEE of the Tire Manufacturers' Division held a meeting in the Association rooms on April 14, to consider in detail the tentative specification of the Bureau of Standards for pneumatic tires. A number of technical representatives of tire manufacturers, not represented on the Technical Committee, also participated in the conference, the work of which was completed at a meeting in Cleveland on April 26 and 27.

An engineering sub-committee of the Mechanical Rubber Goods Manufacturers' Division met at the Association rooms on April 14, to consider the subject of the standardizing of rubber belt and pulley sizes. The subject was thoroughly discussed in a general way and an outline prepared for treating the various phases in detail. Members of the sub-committee are studying the problems preparatory to another meeting of the committee.

The customary monthly meeting of the Executive Committee, Tire Manufacturers' Division, was held in the Association rooms on April 20. The disposition of a number of routine matters required the attention of the committee until late in the afternoon.

The development of the plans for the compilation of monthly statistics covering mechanical rubber goods was the principal subject of discussion at the usual monthly meeting of the executive committee of the Mechanical Rubber Goods Manufacturers' Division, held at the Yale Club on April 26.

The Traffic Committee held its April meeting in the Association rooms on April 18, and devoted the entire day to routine matters. Several members of the committee left that evening for Baltimore, to inspect the harbor and terminal facilities in that city, for handling shipments of rubber goods via the Panama Canal to the Pacific Coast.

The Board of Directors met at the Union League Club at 1 o'clock on April 29, in accordance with the schedule arranged for regular meetings.

PUBLICITY COMMITTEE OF EXECUTIVES APPOINTED

The Association will undertake educational work (publicity) on behalf of the rubber industry; a committee will be constituted of representatives to be designated by the following named firm members from the personnel of their several executive staffs: Firestone Tire & Rubber Co., Pennsylvania Rubber Co., Hewitt Rubber Co., Hood Rubber Co., The B. F. Goodrich Co., United & Globe Rubber Co., Hodgman Rubber Co., Kelly-Springfield Tire Co., The General Tire & Rubber Co., L. Littlejohn & Co.

FOREIGN TRADE BUREAU

In accordance with resolutions adopted by the Executive Committee of the Foreign Trade Division, a Foreign Trade Bureau has been added to the Association, under the management of P. L. Palmerton, who will devote his present attention to the following: Information bureau, information bulletins, rubber exporters' handbook, straight-side tire promotion, translation of rubber goods terms, employment bureau, collection of credit data, listing of desirable forwarders, and others.

It is intended to enlarge this program with other services as they may be requested or as the facilities of the bureau may permit.

The present membership of the Foreign Trade Division includes all members who are devoting much attention to export trade. However, the division extends an invitation to other firm members to become enrolled in the division. The manager of the Foreign Trade Bureau will, upon request, be glad to handle the details of enrollment of firms and recognition of representatives.

The meetings of the Executive Committee of the Foreign Trade Division are regarded as "open," and a welcome will be extended to a representative of any member of the division. Also, the division will appreciate the privilege of including in its docket, subjects of export interest that any member wishes to suggest. The executive committee has selected the third Friday of each month as its regular meeting date.

COST ACCOUNTING FOR RUBBER GOODS MANUFACTURERS

A study of the cost accounting problems of rubber goods manufacturers with the object eventually of outlining cost accounting methods for various branches of the industry will be undertaken by a cost accounting committee of experienced accounting executives from the staffs of the following named companies: The B. F. Goodrich Co., Firestone Tire & Rubber Co., United States Rubber Co., Hood Rubber Co., Ajax Rubber Co., Inc., The Fisk Rubber Co., Boston Woven Hose & Rubber Co., The Miller Rubber Co., Star Rubber Co., Kelly-Springfield Tire Co. (and one to be designated by the Rubber Manufacturers' Association of New Jersey —Trenton Association).

STATISTICS COMPILED FROM QUESTIONNAIRES NOS. 103 AND 104, COVERING THE YEAR 1920[1]

	Reported by Manufacturers Who Also Reclaim	Reported by Reclaimers Solely	Total	Approximate Amount Scrap Used per Pound of Reclaimed Produced
Reclaimed rubber produced from raw and cured scrap .....*pounds*	77,920,594	102,059,654	179,980,248	1 lb. 5 oz.
Scrap rubber (including raw and cured scrap) consumed in production of reclaimed rubber...*pounds*	100,659,857	134,786,740	235,446,597	

NUMBER OF POUNDS OF CRUDE RUBBER CONSUMED IN THE MANUFACTURE OF RUBBER PRODUCTS AND TOTAL SALES VALUE OF SHIPMENTS OF MANUFACTURED RUBBER PRODUCTS

Product	Number of Pounds Crude Rubber Consumed	Total Sales Value of Shipments of Manufactured Rubber Products
Tires and tire sundries		
Automobile and motor truck casings.....	204,852,163	$315,367,820
Automobile and motor truck tubes.....	51,025,392	42,148,440
Solid tires.....	26,482,247	18,441,402
Other tires and tire sundries.....	10,075,927	17,004,388
[2]Total—Tires and tire sundries.....	292,435,729	392,962,050
Other rubber products		
Mechanical goods.....	28,592,490	82,240,087
Boots and shoes.....	32,610,547	61,707,773
Other products.....	16,250,905	61,809,742
[2]Total—Other rubber products.....	77,453,942	$205,757,602
Grand total—All products.....	369,889,671	$598,719,652

[1]The number of manufacturers reporting statistics for the first half of 1920 was 142; for the second half, 143. The number of reclaimers reporting for the first half was 7; for the second half, 8. The average total daily number of employes reported for the first half of 1920 was 199,750, and for the second half, 189,662.

[2]It should be noted that the above totals of "Tires and tire sundries" and "Other rubber products" include some figures which are not shown under the various items, which is due to the fact that some of the reports received were not itemized; for the same reason, under "Tires and tire sundries," in a few instances the data submitted by individual members covering "Automobile and motor truck tubes" have been assigned to "Automobile and motor truck casings," wherever it has appeared desirable to do so, with respect to both the number of pounds of crude rubber consumed and the total sales value of shipments of manufactured rubber products.

Attention is directed to the fact that the totals shown above are the result of a compilation of statistics furnished by individual rubber manufacturers and reclaimers in the United States, and do not include figures of manufacturing firms located in Canada, as did the "Statistics Compiled from Questionnaires Nos. 101 and 102," covering the year 1919.

INTERESTING LETTERS FROM OUR READERS

LONDON COUNTY COUNCIL HOUSING BONDS

TO THE EDITOR:

DEAR SIR: The enclosed circular of the London County Council housing bonds describes the one method that has been successful in Europe in providing funds for housing purposes.

Why can we not adopt something that has proved satisfactory elsewhere instead of wasting time endeavoring to discover something that is all-American? Must we have another Liberty motor episode, trying to learn how to make all-American airplanes and motors when we could have much more quickly adopted the kind Europe was making successfully during the war, and which it was proved would work?

Americanism is one thing. Chauvinism is another.

New York, N. Y. R. J. CALDWELL.

The securities referred to by Mr. Caldwell, which have been termed one of the most meritorious issues made in years, are the London County Council 6 per cent bonds to provide funds for the urgent housing needs of the metropolitan boroughs. They are sold for cash, or in four instalments, in denominations of £5 or in multiples thereof, to be repaid at par in five, ten, and fifteen years as desired by the buyer. Interest is payable semi-annually, and both interest and principal are secured by the property and revenues of the London County Council and the rates of this council outside the city. The council allows a brokerage of ¼ of one per cent and pays stamp duties on all transfers. The bonds are free of income tax at source of issue up to £100.—THE EDITOR.

PROPER AND IMPROPER VULCANIZATION OF INNER TUBES

TO THE EDITOR:

DEAR SIR:—The true measure of the proper elasticity in an inner tube is the stretch to break and the recovery from a stretch 60 to 70 per cent of breaking strain. Tensile, upon which so much stress is foolishly laid, is a secondary consideration. It is always possible to secure greatly increased temporary tensile strength either by increasing the vulcanization beyond the limits imposed for long life, or by using an excessive amount of what are loosely termed accelerators. Now let us see what happens when temporary tensile strength is thus artificially increased for a sales argument only, because it is not a service argument.

Given a compound containing 90 to 95 per cent rubber by volume, with 3 per cent sulphur, and not more than 0.50 per cent of hexamethylene tetramine as an accelerator, if properly vulcanized, a tube of this quality should stretch from 2 inches to 12 inches, and be so held for ten minutes, then allowed to recover for ten minutes. The stretch remaining over the original 2 inches should be about 10 per cent or 2.2 inches. Tensile strength should be about 2,000 pounds to 2,200 pounds per square inch. Now to increase this tensile by vulcanizing to 2,600 or 3,000 pounds, what happens? The stretch may not be affected immediately and perhaps not even for six months, but as sure as the Lord made little apples, such a tube will crumble and die soon after six months, and very likely earlier. When the recovery from stretch shows only 2½ to 5 per cent, there is something rotten in Denmark. The tube is doomed to a young, untimely death. If excessive tensile is secured by using as high as 1½ to 2 per cent of the accelerator mentioned, the result is even worse. Such tubes probably will not last three months.

Over-vulcanizing or the use of an amount of so-called accelerators, which are really catalysers and like poison, to be used in very small doses, give very pretty attractive first effects, which are really about as wholesome as the hectic flush of one in the last stages of tuberculosis. Such tubes are translucent, smooth, free from all bloom or sulphur deposit, very, very attractive indeed, but good only for the show window, or the salesman's grip; absolutely no good at all for long service. Take an extreme case, the tensile strength of such a compound as given may be increased to 4,000 pounds if the vulcanizing is continued until hard rubber is secured. It can easily be seen that while this material is all right for pipe stems, etc., it is scarcely the thing for an elastic tube, and here endeth the tensile lesson.

Jersey City, New Jersey. SUPERINTENDENT.

THE EDITOR'S BOOK TABLE

"THE PLANTING ENGINEER." BY C. REID, COLOMBO. TIMES of Ceylon Co., Limited, Colombo, Ceylon. Cloth, 371 pages.

THIS BOOK which is intended for the planter of rubber, tea and coconuts, deals exhaustively with practical engineering as applied in the manufacturing processes employed on the estates in the Far East. The book comprises 27 chapters and appendix grouped under the following sections: Rubber, power, electric light and power, tea, transport and coconuts.

A full description of all machinery connected with the products named is given with instructions for working and general upkeep. General information is afforded on electric lighting, water supplies, transport by road and aerial tramway, followed by an appendix of useful facts, figures and tables. A full index is provided and the book is liberally illustrated. The instructions are simple, direct and as non-technical as possible. The book will be found a valuable aid to every estate engineer.

"PRIESTLEY IN AMERICA," 1794-1804. BY EDGAR F. SMITH, University of Pennsylvania. Cloth, 173 pages, 7½ by 5 inches.

This book should be of great interest to readers, as elsewhere in this issue appears a sketch of Joseph Priestley, the man who named india rubber. The book deals with the adventures and activities of Dr. Priestley during the years spent in America after being forced to leave France and England because of his radical sympathies. The book contains no illustrations, not even a frontispiece of Priestley, but is attractively printed and contains copies of many letters exchanged between the doctor and his numerous American friends.

NEW TRADE PUBLICATIONS

A BROCHURE, "THE GOLDEN YEAR OF GOODRICH, 1870-1920, Fiftieth Anniversary," has just been published by The B. F. Goodrich Co., Akron, Ohio. It commemorates the fiftieth anniversary of the founding of the company, dealing not only with the history of the origin and growth of the company, but the part that rubber plays in the industrial development of the world and individual life. The context is written by Wilbur D. Nesbit, and colored symbolic illustrations representing Earth, Air, Fire and Water are reproduced from paintings by W. T. Benda. Throughout are numerous croquis of places, incidents, and machinery, while the last few pages are devoted to a list of the officials, branches of the company in the United States, foreign branches and foreign distributers.

TECHNICAL AND SCIENTIFIC BOOK SECTION, FROM THE 1920 EDITION of the Chemical Engineering Catalog. Chemical Catalog Co., New York.

This alphabetical list of authors' names includes practically all the current works on chemistry and chemical technology and is preceded by a subject index. Valuable for ready reference.

"THE RUBBER INDUSTRY," THE FIRST OF THE AFFILIATED BULLETINS for firm and affiliated members of The Rubber Association of America, made its appearance early last month. It is a six-page leaflet which will be distributed at intervals of about two weeks, and will cover such subjects as are likely to be of interest to Association members in connection with the rubber industry, as for instance, legislation, taxation, traffic and transportation (rail and highway), industrial relations, foreign commerce, raw materials, statistics, Association activities, meetings, etc., and miscellaneous information.

"HALOWAX IN THE RUBBER INDUSTRY."—IN AN EIGHTEEN-PAGE pamphlet bearing the above title, the Condensite Company of America, Bloomfield, New Jersey, describes the physical properties of Halowax and the application of different grades in rubber manufacturing, illustrated by typical mixings.

THE AMERICAN SOCIETY FOR TESTING MATERIALS, PHILADELPHIA, Pennsylvania, has issued Bulletin No. 1, April 1, 1921, consisting of four pages dealing with the activities of the A. S. T. M., and notes and publications of interest to members.

JUDICIAL DECISIONS

MCLEOD TIRE CORPORATION VS. THE B. F. GOODRICH CO. District Court, Southern District of New York. February 28, 1920. No. 554.

The court will allow liberal inspection and compel answers to interrogatories in patent cases. In a tire patent case, inspection of working drawings or blue-prints from the records of defendant, showing molds, cores and other working parts used in the commercial production of defendant's tires, would not be denied because of defendant's objection that these represented the details of a secret process of manufacture employed by defendant. The secrecy of the process would be safeguarded by the order so far as possible.

In the above suit in equity the court granted in part the motion of the plaintiff to be allowed inspection of drawings, etc.—*Federal Reporter*, Volume 268, page 205.

WILLYS-OVERLAND CO. VS. AKRON-OVERLAND TIRE CO., INC., District Court, District of Delaware. In equity. August 2, 1920. No. 386.

In a suit in equity by the Willys-Overland Co. against the Akron-Overland Tire Co., Inc., a preliminary injunction was sought restraining the defendant from using the word "Overland" as the whole or any part of its corporate name, from listing its capital stock upon the New York Curb Market or any other association or exchange where listed stocks and securities are dealt in, under any name containing the word "Overland," and from designating its tires, or other automobile accessory made or sold by it, by the word "Overland," or by any combination of words containing that name.

Morris, District Judge, rendered the opinion that from the evidence the defendant was using "Overland" in its corporate title unfairly and to the detriment of the plaintiff; that the use by a defendant in its name of a word calculated to lead the public to believe its goods are the goods of the plaintiff, may be enjoined; that a preliminary injunction should be granted; and that a decree in conformity therewith might be submitted.—*Federal Reporter*, Volume 268, pages 151–155.

IN RE SCHWEINERT ET AL. Court of Appeals of District of Columbia. Submitted November 8, 1920. Decided January 3, 1921. No. 1323.

In the matter of the application of Maximilian Charles Schweinert and another for the patent of a tire valve, the defendants appealed from the refusal of the Commissioner of Patents to grant such a patent. The Court agreed with the Commissioner that the applicant had made no patentable advance over the prior art. The decision was therefore affirmed.—*Federal Reporter*, Volume 269, page 1020.

TREASURY DECISIONS

No. 44145.—Protest 935857 of Davies Turner & Co., New York.

RUBBER ATTACHMENTS FOR SOLES AND HEELS; WEARING APPAREL.—These articles are classified as articles of wearing apparel composed of cotton and india rubber at 30 per cent ad valorem under paragraph 256, tariff act of 1913, and are claimed dutiable as manufactures in chief value of india rubber at 10 per cent under paragraph 368.

Opinion by WELLER, G. A.: Proportionate values of component materials not shown, but found evident rubber is of chief value; therefore, claim that they are dutiable as manufactures in chief value of india rubber under paragraph 368 was sustained. These attachments are excluded from paragraph 256 on authority of Steinhardt vs. United States (8 Ct. Custom Appeals, 372; T. D. 37629).—*Treasury Decisions*, Volume 39, No. 14, page 10.

ADJUDICATED PATENTS

PALMER ET AL VS. JOHN K. STEWART & SONS, INC. United States District Court, New York.

The Palmer patent, No. 878,995, claim 1, for apparatus for inverting tubular fabrics, held infringed.—*Federal Reporter*, Volume 269, page 148.

THE OBITUARY RECORD

WELL-KNOWN RUBBER FOOTWEAR MANUFACTURER

TRACY SAMUEL LEWIS, president of the Beacon Falls Rubber Shoe Co., Beacon Falls, Connecticut, died suddenly on April 3, at his home in in Brooklyn, New York, in his forty-eighth year.

TRACY S. LEWIS

Mr. Lewis was born in Naugatuck, Connecticut, in 1873, and was educated at Greenwich Academy, Greenwich, Connecticut, and the Sheffield Scientific School, Yale University, graduating in 1894. Four years later he became secretary and treasurer of the Beacon Falls Rubber Shoe Co., of which his father, the late George A. Lewis, was president. On his father's death in 1914, Mr. Lewis became president of the company, which has continued to prosper under his management.

Several other firms closely allied with the rubber industry claimed part of his time. He was president and treasurer of the Connecticut Mills Co., tire fabric manufacturers, Danielson, Connecticut; treasurer of the Canadian Connecticut Cotton Mills, Limited, tire fabric manufacturers, Sherbrooke, Quebec, Canada; president of the Medford Woolen Manufacturing Co., Medford, Massachusetts; president of the Nobska Spinning Co., Taunton, Massachusetts; president and treasurer of the Continental Clay Co., Langley, South Carolina; and a director of the Naugatuck National Bank, Naugatuck, Connecticut, and of the Connecticut Cottons Co., Boston, Massachusetts. He was a member of The Rubber Association of America, Inc., and in 1917, one of its directors.

His widow, Grace Meacham Lewis, survives him, and his untimely death is mourned by many friends and trade acquaintances. Funeral services were held at the residence of his father, the late George A. Lewis, Naugatuck, Connecticut, and interment was also at Naugatuck.

A PIONEER IN THE MANUFACTURE OF RUBBER STAMPS

Charles Everson, one of the earliest to develop the rubber stamp in the commercial world, died April 14 at his home in Orange, New Jersey.

He established the Everson & Reed Co., manufacturer of rubber stamps, in 1875, which in 1914 acquired the Carragan & Tilson plant manufacturing metal badges, stencils and dies, thus joining the two oldest organizations. He served as first president of the New York Stamp Club when it was organized and later as president of the International Stamp Manufacturers' Association.

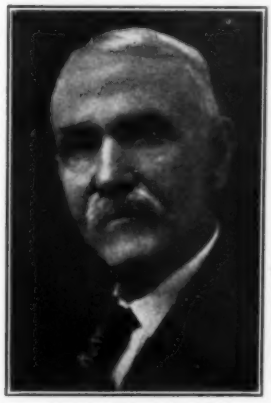
Mr. Everson was president and treasurer of Everson & Reed Co., 88 Chambers Street, New York, until his death. He was

particularly active in Grand Army work, as patriotic instructor and Senior Vice-Commander of Lafayette Post No. 140, New York, which conducted the Grand Army ritual service at his funeral.

The Everson & Reed Co. will continue to serve the trade under the direction of Mrs. Morris.

ACTIVE IN RUBBER MACHINERY MANUFACTURE

James Willett Chamberlain, whose death in Akron, Ohio, March 18, was noted in the April issue of THE INDIA RUBBER WORLD, was born in Redfield, New York, in 1843. Following his education in the village schools of that place, his first duty was to his country in the Civil War. Enlisting from Summit County, Ohio, in Company C, 115th Regiment, Ohio Volunteer Infantry, he served until the close of the war, being promoted to sergeant for brave and meritorious conduct.



JAMES W. CHAMBERLAIN

Later in 1865 he began to serve his apprenticeship as a machinist at Webster Camp and Lane Machine Shop until his promotion to superintendent, a position which he held for many years, followed by several years as superintendent of the clutch department of the Williams Foundry & Machine Co., Akron, Ohio. At the time of his death he was identified with the Akron Equipment Co., Akron, Ohio. He was also connected with the Welman-Seaver-Morgan Co., Cleveland, Ohio; was a director of the Acme Steel Co. as well as a director of The India Tire & Rubber Co. and the Atlantic Foundry Co., both of Akron, Ohio. He was besides interested in several other firms.

Mr. Chamberlain was a member of the G. A. R. and received a pension until the World War, at which time he returned to the Government the full amount paid him and requested that his pension be canceled. This instance typifies the splendid spirit of integrity which won many friends for one of Akron's oldest and best-known rubber machinery men.

FORMER NEW JERSEY RUBBER MAN

Warren A. Greene, former general manager of the Lambertville Rubber Co., died on April 11 at his home in Lambertville, New Jersey, aged 89 years. Death was due to the infirmities of old age. He was president of the Amwell National Bank, Lambertville, and had been affiliated with the rubber company as general manager for about fifty years, having relinquished active duties a few years ago, owing to failing health. The interment was made at Providence, Rhode Island. He is survived by a son and daughter.

PROMINENT IN CIVIC AND FRATERNAL ORGANIZATIONS

Colonel Walter Rodney Williams, for twenty years connected with the Woonsocket Rubber Co., the footwear division of the United States Rubber Co., and in recent years employment manager at the Alice mill, died April 15 at his home in Woonsocket, in his sixtieth year.

Colonel Williams was born in Boston, Massachusetts, in 1862, and attended the public schools of Woonsocket, and was for some years employed in the Woonsocket office of the Adams Express Co. He then became a member of the office force of the Woonsocket Rubber Co., and was gradually promoted until he became employment manager, which position he held at the time of his death. For years he was secretary of the Woonsocket Business Men's Association, corporation clerk of the Woonsocket Chamber of Commerce, one of the first commanders of Gordon Camp Sons of Veterans and, later, the commander of Rhode Island Division with rank of colonel. He was a member of the Blackstone River Lodge of Masons, Woonsocket Commandery, Knights Templars, and Palestine Temple of the Mystic Shrine, and Roger Williams Council, Royal Arcanum. He is survived by his widow and three daughters.

RUBBER TRADE INQUIRIES

THE inquiries that follow have already been answered; nevertheless they are of interest not only in showing the needs of the trade, but because of the possibility that additional information may be furnished by those who read them. The Editor is therefore glad to have those interested communicate with him.

(861) Information is requested concerning the use of "reclaiming salts" in reclaiming.

(862) Inquiry is made for the address of the manufacturer of "J. B. L." cascades.

(863) A request has been received for the address of the manufacturer of machines for inflating rubber balls.

(864) A reader desires the addresses of manufacturers of machinery for repairing rubber footwear.

(865) A manufacturer of gold-ball molds abroad desires the addresses of American golf-ball manufacturers; also, of manufacturers of both balls and molds.

(866) A rubber manufacturer requests the addresses of makers of 36-inch breaker fabric and 36-inch tire-building fabric.

TRADE OPPORTUNITIES FROM CONSULAR REPORTS

Addresses may be obtained from the Bureau of Foreign and Domestic Commerce, Washington, D. C., or from the following district or cooperative offices. Requests for each address should be on a separate sheet, and state number.

DISTRICT OFFICES.	COOPERATIVE OFFICES.
New York: 734 Customhouse.	Cleveland: Chamber of Commerce.
Boston: 1801 Customhouse.	Cincinnati: Chamber of Commerce; General Freight Agent, Southern Railway, 96 Ingalls Building.
Chicago: 504 Federal Building.	
St. Louis: 402 Third National Bank Building.	Dayton, Ohio: Dayton Chamber of Commerce.
New Orleans: 1020 Hibernia Bank Building.	Los Angeles: Chamber of Commerce.
San Francisco: 307 Customhouse.	Philadelphia: Chamber of Commerce.
Seattle: 848 Henry Building.	Portland, Oregon: Chamber of Commerce.

(34,585) An American citizen who has spent many years in Argentina engaged in the import trade, now in the United States, desires to secure an agency in Argentina and Uruguay for the sale of automobile accessories.

(34,602) A commercial agency in Belgium desires to secure an agency for the sale of bicycle accessories.

(34,613) A firm of manufacturers' representatives in India desires to secure an agency for the sale of rubber goods throughout India.

(34,638). An agency for the sale of motor cars and accessories is desired by a mercantile company in Australia.

(34,646) A firm of engineers in Sumatra desires to secure the agency for the sale of lightweight caterpillar tractors suitable for use on rubber estates.

(34,663) An official of a port in Mexico desires to secure catalogs with a view to purchasing for lifeboat crews rubber suits and rubber boots. Catalogs should be accompanied by photographs.

(34,664) An established importer with offices, showrooms and stock rooms in Australia desires to secure agencies from manufacturers for the sale of automobile accessories. Catalogs and prices requested.

(34,680) An importing firm in Austria desires to purchase large quantities of crude rubber immediately.

(34,728) A mercantile firm in India desires to receive catalogs and prices on automobiles, motorcycles and accessories.

(34,731) A mercantile firm in Bulgaria desires to purchase and secure an agency for the sale of whirling-spray syringes.

(34,748) A firm of merchants in Canada desires to purchase stair treads.

(34,752) An agency is desired by a mercantile company in India for the sale of motor and bicycle accessories.

BEFORE THE CLOSE OF THE YEAR 1919, LESS THAN 500 automobiles had been imported into Pernambuco, Brazil, while in December, 1920, there were only 860 licensed automobiles in that city. Since then, however, about 1,000 cars have been imported, and tires for approximately 1,500 cars are required. Most tires imported are of American manufacture. A list of Pernambuco importers of rubber tires may be obtained from the Department of Commerce, Washington, D. C., by referring to file L. A. 12013.

FRENCH DISAPPROVE STRAIGHT-SIDE TIRES

The following article discussing straight-side tires appeared in *La Vie Automobile*, written by one of our French contemporaries. All of the pneumatic tires employed in France for a long time have been of the soft bead or clincher type, mounted on a rim having on each side a clincher in which the round portion of the bead engages. Placing a clincher tire on a rim is made a very easy matter by the use of suitable levers. Straight-side tires entail the use of a relatively complicated rim, which increases the weight of the wheel at the rim and, consequently, its inertia.

The farther away from the axis the weight of the wheel is located the longer will be the lever arm which moves the weight in its rotation, and the greater the effort required to get it up to speed. Inversely, the greater the amount of energy stored up in the wheel once it has been brought up to speed, the more violent must be the braking action, and the disadvantages of a road wheel acting as a flywheel are well known; it is these disadvantages which have led to the almost complete abandonment of the numerous designs of demountable rim, which apparently are more attractive than the demountable wheel.

It is easy to measure the power required to start a wheel when fitted with a clincher and straight-side tire respectively. Experiments were conducted with two wheels identical up to the tires, in which the difference in weight at the circumference amounted to 23.43 pounds.

The tire loaded with a weight of 1,100 pounds is carried at the end of a lever arm, resting on the surface of a drum which turns at a peripheral speed of 30 m.p.h., and driven by an electric motor. The power absorbed by the motor is measured by a voltmeter and an ammeter. The tire is first raised so that it does not touch the drum on which it bears. On the voltmeter and ammeter are read off the power consumptions corresponding to starting and normal running. Chronometer readings are taken of the time elapsing before the starting point and the normal speed are attained. The results of the experiment show:

1. On starting the straight-side wheel takes 426 watts more than the clincher wheel. This is more than ½-h.p. and is enormous (1 h.p. = 746 watts).

2. The normal speed is attained by the clincher tire at the end of 3 minutes 9 seconds, and by the straight-side tire at the end of 6 minutes.

3. At normal speed the straight-side tire takes 100 watts (1/7-h.p.) more than the clincher.

The phenomena observed at the moment of starting are reproduced, in an inverse sense, when the brakes are applied. The figures cited above refer to one wheel; the car has four of them; therefore, these figures must be multiplied by four in order to get an idea of what is going on on a vehicle. The phenomena above described take place not only on starting and braking but at every acceleration and deceleration, with reduced force.

THE MAN WHO NAMED INDIA RUBBER

TO GIVE anything a name that sticks through the centuries is somewhat of a feat. One has only to try it to discover just how difficult it is. India rubber had a variety of names until Dr. Priestley, using a bit of the Indian gum for erasing, called it india rubber. And just here some, many, will say, — "Who was Priestley?"

JOSEPH PRIESTLEY, LL.D., F.R.S.

Joseph Priestley, LL.D., F.R.S., a chemist, was born in Fieldhead near Leeds, Yorkshire, England, in 1733, his father being a fairly prosperous woolen cloth dresser. Although frail in health, he became a profound scientific and theological student and learned nearly a dozen languages. While conducting a private school and later, while a Unitarian minister, he delved deeply into chemistry, optics, electricity, etc., constructing his own apparatus. His opposition to the established church in sermons and tracts, and his sympathy with the French revolutionists, aroused much ill feeling; and in 1791 his home in Birmingham, with his manuscripts and apparatus, was destroyed by a mob. Birmingham now honors him with a marble statue in front of its town hall. He fled to London but there he was shunned even by his fellow members of the Royal Society, and he resigned. Appointment as literary companion of Lord Shelburne relieved his poverty and enabled him to resume his scientific researches.

In 1794 he went to live with his sons in Northumberland, Pennsylvania, and died there in 1804. On arriving in America, Priestley was greeted by the Governor of New York, was dined by President Washington, and had frequent conferences with Benjamin Franklin, whom he had known well abroad.

Priestley, perhaps best known as the discoverer of oxygen, which he termed "vital air," also produced carbonic acid gas, which he termed "fixed air," commercially, thus laying the foundation for soda water manufacture. The discovery by him, too, of nitrous oxide gas was the basis of modern anæsthesia. His experiments and scientific observations, as well as his principles of grammar, law, theology, etc., are set forth in twenty-five volumes. His frank, engaging memoirs are, however, more generally known and best appreciated.

HALOWAX OIL

Halowax oil is used in the treatment of fabric to improve the "frictioning" or bonding of rubber to it. There is no added solvent liquid in this oil, which must be removed before vulcanization. The boiling point of the oil is so high that it is not volatilized under the vulcanization temperature and therefore remains in combination in the finished work. The action of the oil is to soften the rubber, so that it penetrates the fiber structure with great ease, and provides a bonding medium between the cloth and rubber. Halowax oil can also be used for facilitating the mixing of fillers, especially those of fibrous nature, into rubber compounds.

The Rubber Trade in Great Britain

By Our Regular Correspondent

THE TURN IN THE TIDE of depression is not yet apparent, and it is difficult to find anything of a really satisfactory nature to report. Most of the rubber factories are working only three days a week, and it would seem that the rubber workers will have to fall in line with their fellows in other industries and accept a reduction in wages if a betterment in trade conditions is to be brought about. Foreign competition, the manufacturers say, has now become a serious matter. In addition to the American tires which are being "dumped" here, French, Belgian and Italian goods are also coming in at prices below the minimum the most up-to-date home works can hope to reach.

WAGES AND EMPLOYMENT

In the waterproof garment industry—that is, the various works which make up proofed cloth—notices have been posted of a reduction of 17½ per cent in wages to take effect on the first pay day after March 28. This has not been agreed to by the workers' unions so far because the reduction in wage is not accompanied by a guarantee of more work. In other sections of the rubber trade seven days' notice has been given of 10 to 12 per cent reduction in some districts. In the Manchester district, except in one case of a 5 per cent reduction, the workers' unions intend to resist the proposed cut in wages, this decision having been reached at a mass meeting held just before Easter. It now remains to be seen what the employes will do.

It must not be overlooked that the position of affairs is the reverse of what existed when wage advances were willingly or grudgingly conceded. Any stoppage of work then meant loss of profit; at the present time, if anything, it would mean cessation of loss. Many employers who are finding work with difficulty for two or three days a week would be by no means averse to a complete stoppage for a time, as this would assist in clearing out the accumulated stocks on hand.

DYEING TEXTILES FOR THE PROOFING TRADE

I have read with interest the report in THE INDIA RUBBER WORLD of the meeting of proofers and dyers held in New York on January 5. The matters principally referred to would seem to have reference only to the rubber proofer or mackintosh manufacturer and not to the rainproof trade, though in the report of the meeting, rubberizers and rainproof material manufacturers are referred to as being equally affected or interested. In Great Britain the two trades are entirely distinct, and I can call to mind only two rubber proofing firms of importance which have a rainproofing plant on their premises. The points under discussion in New York as to the avoidance of certain dyeing materials were under consideration in England 20 to 30 years ago, Bradford dyers and Manchester waterproofers having long worked on lines which barred the use of copper and manganese salts. The limit of 2 per cent of ether extract has also long been in use. The case of chromium is interesting; it has often been indicted, but the evidence for the prosecution has always seemed to me to be weak, and I am glad to see that a committee was appointed at the New York meeting to make tests to determine the effect of chromium compound upon rubberizing. I note that the effect of iron is to be studied. I do not know how far the cold cure of proofed fabrics is being utilized in America, but it has been generally recognized in England that the dyer's responsibilities are much heavier in the case of the cold than of the hot cure. In the former case the free acid produced may convert metallic oxides into salts, whence in the hot cure they remain unaffected. With regard to iron, for instance, it is supposed that while ferric oxide is harmless, ferric chloride is dangerous. Chromium has, of course, been very largely used during the late war, as the yellow of the khaki was due entirely to chromium salts and not at all to organic coloring matters. As the dyeing is effected in an acid bath, it is essential that the cloth should be put through an alkaline bath to remove the last traces of acid. There has been reason to suppose that the complete removal of acid has not always been effected in cloth intended for rubberizing, and this matter, with its possible consequences, might, I suggest, be added to the agenda of the New York investigators.

THE UNBURSTABLE BALL

At first sight a child's playing ball, which is estimated to remain in good condition for about a dozen years, does not seem a very paying proposition. This, however, is not the view of the two English concerns which have mastered the problem of making the cellular rubber bouncing ball. The current demand for these balls, which are produced and sold at an extremely satisfactory profit, has outrun the maker's capacity of production. It seems a matter for legitimate surmise as to what effect these balls will have upon the ordinary hollow playing ball industry. There used to be a hollow ball convention as to prices between the German and British makers, but I believe that came to an end with the war. As far as the English output is concerned, the only firm which counts is the New Eccles Rubber Works, Limited, of Manchester, the original owners of Cox's machine.

FINANCIAL NOTES

The Dunlop Rubber Co., Limited, issue of £3,000,000 8 per cent first mortgage debenture stock at 98 per cent was not largely subscribed to by the public, the underwriters having had 73½ per cent left on their hands.

The Empire Waterproof Co., of Houndsditch, London, of which Barnett Abrahams was sole proprietor, has failed with liabilities of £9,701 due to unsecured creditors, the largest claim being that of the Express Rubber Co., Limited, of London, for £5,503.

The Leyland & Birmingham Rubber Co., Limited, has decided not to pay the usual 5 per cent interim dividend, owing to the present abnormal financial conditions and the extremely unsettled state of all markets.

The Chemical Engineering Corporation, Limited, interested in artificial leather and tires, with a factory at Southhall, Middlesex, has failed for about £40,000, with practically no assets. The corporation was concerned with the flotation of the Standard Tyre & Rubber Manufacturers, Limited, now located in the Alperton factory, Wembley, near London. This company is not directly concerned with the failure, though it figures as a large creditor.

The United Malaysian Rubber Co., Limited, is to be wound up, but the first meetings of creditors and contributories will not be held until June 16 in London.

The British Insulated & Helsby Cables, Limited, is paying 15 per cent for 1920, the same as in 1919, the profits amounting to £340,713, as against £328,688 for 1919. The factories at Helsby and Prescot are stated to have been worked at full capacity. This report, taken in conjunction with that of the Telegraph Construction & Maintenance Co. and the Henley Telegraph Co., indicate that the slump which affected the rubber trade in the second half of last year was not shared by the electrical cable firms.

The Victor Tyre Co., Limited, with which Sir W. Y. Jones has been closely connected, has gone into liquidation, with liabilities of £62,396. The works are at New Malden, Surrey.

The Research Association of British Rubber and Tire Manufacturers is among the associations of manufacturers formed in England to conduct industrial and scientific research in the fields of their industries, and have been given governmental assistance.

THE RUBBER CLUB SCHEME

This has now assumed definite form, though by no means on the lines which many of its original supporters had anticipated. To the average Briton the term club has a somewhat closely defined meaning quite apart from a business association, which the new club now appears to be. In this way its activities and procedure are much on the lines of the Rubber Association of America, which includes in its functions much of what is already provided for in our Rubber Manufacturers' Association. The Rubber Club of Great Britain will not conflict with the established Manufacturers' Association, its energies being directed into different and more varied channels. The bulletin which it is proposed to publish, and which will be sent free to all members, will be conducted on novel lines, and will not cover ground already dealt with by the established trade journals. Mention is made of the fact that the need of central commodious club premises can be met later when justified by financial or other considerations. The present position is that a bulletin has been sent to the rubber trade in its varied branches and interest, inviting applications for membership on the following lines, and no doubt the proposed constitution and organization will depend upon the response.

Full members: Rubber manufacturers, whether corporations, firms or persons, and corporations, firms or persons providing raw materials and machinery used in the rubber and allied industries; annual subscription, £21.0.0.

Merchant members: Merchant corporations and firms interested in the rubber and allied industries; annual subscription, £10.10.0.

Associates: Individuals connected with or interested in the rubber and allied industries; annual subscription, £2.12.6.

I do not notice any reference to the inclusion or otherwise of non-British subjects. As one of the specified objects of the club is to watch foreign competition and keep its members advised thereon, a somewhat delicate situation might be created if representatives of foreign firms or non-naturalized foreigners were members thereof. But no doubt this, together with other matters relating to membership, will come before the new committee to be chosen from those who have been circularized and accepted membership.

THE LONDON RUBBER EXHIBITION

The Governments of Indo-China, Gambia, Java and Sumatra also have decided to take part in the Fifth International Exhibition of Rubber and other Tropical Products to be held in London, June 3-9, 1921.

A. Garnier, director of the Agence Economique in Paris of the Government of Indo-China, is to visit London personally and represent his government at the Congress and the Exhibition. Auguste Chevalier, director of the Institut Scientifique de Saigon, will accompany Mr. Garnier and also read a paper on "Progress of Hevea Cultivation in Indo-China."

The participation of the Government of Gambia in the Exhibition adds to the already outstanding importance of the West African Section.

Dr. O. de Vries, director of the Central Rubber Station, Buitenzorg, Java, is arranging for Java's participation in the exhibition. Dr. de Vries will read a paper at the Congress on "The Influence of Field Conditions and the Treatment of the Trees on Latex and Rubber."

An exhibit will be made by the General Experimental Station of the A. V. R. O. S., Medan-Deli, Sumatra. The director of the station, Dr. A. A. L. Rutgers, will contribute papers to the Congress, entitled "The Selection of Rubber" and "The Cultivation of Oil Palms."

The Hunter Dry Kiln Co., Indianapolis, Indiana, will introduce their method of drying and processing rubber to foreign trade by operating a unit at the Fifth National Rubber Exhibition in London. Francis Shaw & Co., Limited, Manchester, who handle the Hunter System in British possessions, excluding Canada, will supervise the exhibit. Harry Hunter, inventor and president of the Hunter Dry Kiln Co. will attend the exhibition and explain the details of the system.

COMPETITION No. 1

Owing to reduction of output, some companies are not marketing scrap grades and, in these circumstances, the Committee have decided that a consignment may consist of *two* grades instead of three grades (75 per cent No. 1 sheet and/or crêpe and 25 per cent No. 2 grade, or compo crêpe, other than scrap) provided the entry is accompanied by a certificate to the effect that scrap grades are not being manufactured and that the consignment fairly represents the present grades turned out by the estate.

NEW COMPETITION (No. 1A)

For Rubber Produced in Malaya and Ceylon, Sold Locally in Singapore and Colombo

The conditions will be identical with those of Competition No. 1 (as amended) except that samples forwarded to the Awards Committee must be accompanied by a certificate similar to that required for wharf-samples drawn in London, such certificate to be signed on behalf of responsible godown approved by local Chamber of Commerce.

Awards will be given for each country according to the number of entries received and will consist of the Association's gold, silver or bronze medals and prizes.

Entries, samples and certificates will be accepted up to and including May 25, 1921.

THE BRITISH RUBBER INDUSTRY SINCE THE ARMISTICE

FIGURES relating to the British rubber industry during 1919 and 1920 have just come to hand and are particularly interesting as showing the continued progress of this industry since the armistice.

During the two years under review, imports of crude rubber increased by about 20,000,000 pounds. In 1919 the total quantity was 228,237,700 pounds, value £24,211,886; and in 1920, 248,368,100 pounds value £24,556,126. Whereas the Straits Settlement sent the largest quantity in 1919, when the figures were 67,351,100 pounds, value £7,187,882, exports showed a decrease in 1920 to 66,516,400 pounds, value £6,499,413, and first place went to the Federated Malay States which had increased the total exports to Great Britain from 62,862,200 pounds, value £6,628,845 in 1919, to 67,151,200 pounds, value £6,860,824 in 1920. British India also advanced with 12,286,800 pounds, value £1,308,035 in 1920, against 11,301,200 pounds, value £1,240,460 the year before. Ceylon and dependencies showed the greatest rate of increase among the leading rubber-producing countries, totals being 47,991,900 pounds, value £4,657,041 in 1920 as compared with 33,498,100 pounds, value £3,605,033 in 1919.

Exports from other Dutch possessions in the Indian Seas dropped from 12,283,200 pounds, value £1,286,691 in 1919 to 8,608,600 pounds, value £870,634 in the following year. However, this decrease from Dutch sources was made up for by the shipments from Dutch East Indies (except other Dutch possessions in Indian Seas) which rose from 13,372,200 pounds, value £1,381,220 in 1919 to 17,769,400 pounds, value £1,667,780 in 1920. Figures for Brazil indicated a gain in quantity, those for 1920 reading 18,354,-

400 pounds, value £1,793,766, as compared with 18,121,400 pounds, value £1,997,385 the year before. It will be noted that though the quantity increased by 233,000 pounds in 1920, the value decreased by £203,619.

Reexports of crude rubber were 132,653,900 pounds, value £13,971,875 in 1919, against 120,753,900 pounds, value £13,854,944, showing a small decrease.

All domestic exports showed substantial advance. The rate of increase was highest in the case of submarine cables, exports of which rose from £622,633 in 1919 to £1,776,940 in 1920—and insulated wire, the value of which jumped from £827,732 to £1,752,916. More than half the value of exports of manufactured goods was accounted for by tires and tubes, the total in 1920 being £6,500,761 as compared with £4,257,651 the year before.

Here it might be worth while to call attention to the fact that imports of tires and tubes during 1920 were not far behind the exports for the same year, having amounted to £5,577,078. This total was over two and a half times as large as that for 1919, which came to £2,148,989.

Another interesting bit of comparison may be made with regard to the item boots and shoes. The value of domestic exports rose from £240,849 in 1919 to £397,763, whereas the value of imports increased from £294,338 to £714,685 in 1920. It is regrettable that the statistics do not give the imports and exports of manufactured articles by countries.

Exports of waterproof clothing nearly doubled in value, the 1919 figures having been £1,728,828, while the 1920 figures read £2,930,240. Other rubber manufactures showed a similar growth, the totals being £2,831,183 and £4,689,739, respectively. Waste and reclaimed rubber reached a value of £397,763 during 1920, as compared with £240,849 the year before. Rubber substitutes were not separately mentioned before 1920, when the total amounts exported valued £123,346.

EUROPEAN RUBBER NOTES

By Our Regular Correspondent

HOLLAND'S RUBBER TRADE IN 1920

CONDITIONS in the rubber trade in Holland during 1920 were similar to those reported from most countries; large imports and exports, good prices during the first few months followed by diminishing demand and falling prices. Although the volume of trade was greater than in 1919, the general tone of the market was depressed.

The chief set-back was the failure of the expected large orders from America to materialize, which resulted in a general collapse in the Holland market that became so serious in the closing months of the year that several important firms had to suspend payments.

During 1920, total imports of crude rubber amounted to 26,074 metric tons (metric ton equals 2,204 pounds), of which 849 tons were wild rubber, 25,134 tons plantation rubber and 91 tons old rubber. The figures for 1919 were 1,274 tons of wild rubber, 13,614 tons of plantation rubber and 397 tons of old rubber—total 15,285 tons.

Exports amounted to 14,532 metric tons in 1920 and consisted of 1,176 tons of wild rubber, 13,296 tons of plantation and 60 tons of old rubber. In 1919 the total was 9,598 tons and consisted of 187 tons wild, 9,355 plantation, 56 tons of old rubber.

All of the exports of wild rubber went to Germany and Austria. Germany also took 7,021 tons of plantation rubber in 1920 as against 3,869 tons the previous year. The United States took 5,229 tons in 1920 as compared with 5,058 tons the year before. The Congo supplied 35 per cent of the imports of wild rubber and Brazil about 40 per cent. The Netherlands East Indies furnished 11,422 tons of plantation rubber during 1920, the rest of the imports arriving from various parts of the world by way of Great Britain.

Rubber authorities in Holland are rather sceptical about the efficacy of the rubber output restriction as a means of keeping up prices, believing that the only hope of better prices is in improved demand, especially from the United States. At present the demand from Germany is poor and the outlook not very promising.

Holland's imports from the United States included oil and rubber tissue, value $215,329 in 1920 and $357,546 in 1919; automobile tires, $1,490,170 in 1920 as against $1,620,024 in 1919; other rubber goods, 207,651 in 1920 and $154,818 the previous year. The value of Holland's exports of crude and manufactured rubber to the United States in 1920 was $3,347,456 as against $3,135,950 in 1919.

Although the trade outlook toward the end of 1920 was very discouraging yet it is noteworthy that, due to the business done in the early part of 1920, the year showed a record trade between Holland and the United States.

FRANCE

Assistant Trade Commissioner Donald L. Breed, Prague, reports that, according to the terms of the commercial treaty between Czecho-Slovakia and France, the former country agrees to import 3,500 metric tons of French rubber goods. It is stated that this quantity is sufficient to cover the needs of Czecho-Slovakia for six years.

At a recent meeting of the Société du Caoutchouc-Mousse it was decided to increase the capital from 2,500,000 to 3,000,000 francs. It was announced that the factories at Aurec, Loire, are developing and that other manufactures were to be added. At present the company makes chiefly hollow play balls and recently the process has been improved and made more economical.

The Société "Caoutchouc Industriel du Sud," 2 bis, rue Ribotti, Nice, has raised its capital to one million francs.

M. Gruenais, rubber manufacturer at Arcueil-Cachan, has established a second factory at Autony.

GERMANY

The news of the decisions regarding the Entente plans of taxing German exports to England, France and Belgium, has caused considerable agitation. The so-called "sanctions" are termed acts of violence and various business associations urge cooperation against this attempt to "destroy German industry, exports and economy." The Zentral Verband der Deutschen Kautschuk-Industrie (Central Union of the German rubber industry) Berlin, has published a call to the rubber industry to take action against the sanctions, by not purchasing from England any crude rubber or other material of English or French origin. It is urged that only rubber be bought that is proved to be of Dutch origin or that was ordered or stored by German dealers before the sanctions came into force.

Furthermore, German representatives of British firms dealing in rubber and other raw material, are to be informed that offers for their British clients cannot for the time being be considered.

The Union of the Hamburg Import Trade resolved at a recent meeting that German merchants are in honor bound to abstain from buying directly or indirectly from enemy countries that have approved the sanctions.

The *Hansa-Bund* warns against dealing with English, French or Belgium firms and advises that all import and export business be done with neutral states and with Italy. This country did not accept the sanctions.

Among further weapons to be used against the sanctions may be mentioned:

Freeing of a number of articles from the export ban.

Abolition of price control of most goods and of quantity control in many departments.

Extreme stringency in the provisions regarding imports, particularly with regard to prohibitions of import of superfluous foreign goods.

GERMAN EXPORTS AND IMPORTS

Recent official statistics show that German imports of soft rubber goods amounted to 14,965 quintals in 1919 and to 17,200 quintals (quintal equals 220.46 pounds), during the first eight months of 1920; imports of hard rubber and manufactures of hard rubber during 1919 were 142 centals and for the first seven months of 1920, 160 quintals.

Exports of soft rubber goods were 3,068 quintals during 1919 and 16,200 quintals for the first eight months of 1920. As for hard rubber and manufactures thereof, the amounts were 222 quintals in 1919 and 692 during the first seven months of 1920. Against these figures, the total exports of soft rubber goods during the first eight months of 1913 were 126,200 quintals and imports 30,300 quintals.

It is interesting to note the gradual increase of imports and exports of soft rubber goods after the war. In January, 1919, the imports were but 2 quintals and up to June the total was but 99 quintals, the amount for the last half of 1919 having been 14,866 quintals. Exports started with 3 quintals in January, 1919 and increased gradually month by month until they jumped from 391 quintals in November, 1919 to 1,692 quintals the following month.

NEW FIRMS

Richard Cars, Gahlenberg, near Stuttgart, wholesale dealers in rubber goods, manufacture of wringing machines, Gummiwarenfabrik Hagufa, G. m. b. H., Harburg a. E., manufacture and sale of rubber goods.

Gummi Handelsgesellschaft "Liga" Putzo & Co., Munich, sale of rubber goods.

"Treügolnick" Deutsche Import and Export Gesellschaft m. b. H., Berlin. Headquarters of this firm have been moved from Hamburg to Berlin. The concern will buy and sell the products of the Russian-American India Rubber Co.

"Treügolnick," Petrograd. It is capitalized at 500,000 marks. The management is in the hands of Franz Albert Robert Zernickow, Berlin; John Friederich Jordan, Hamburg; Georg Stumpf, Berlin-Wilmersdorf.

Gummiwerke Stoeckicht G. m. b. H., Sterbfritz (Bez. Kassel), manufacture of rubber goods, trade in crude rubber, semi-manufactured and manufactured goods.

Presser & Compagnie, Berlin-Tempelhof, manufacture and sale of metal and rubber goods.

Gummi- und Turnschu-Verkaufs, G. m. b. H., Breslau, trade in rubber shoes, shoes for gymnastics, tennis, beach; rubber soles and heels and similar articles.

Firma Gummi-Aufbereitungs-Gesellschaft m. b. H., Frankfort-on-the-Main, separating and milling of soft and hard rubber; preparation of rivets, protectors, treads, and general preparation of rubber and semi-manufactures.

Firma Vulcasta, G. m. b. H., Berlin, exploitation of the inventions of Gustav Schäfer concerning vulcanization methods in repairing of tires and tubes.

Gummiwarenfabrik Imperator Jander & Lemcke, Berlin-Tempelhof; manufacture of rubber goods

NEWS NOTES

The Saarbrücker Asbest- und Gummi-Industrie Nöll & Resch, Saarbrücken, has been dissolved.

The annual report of the Norddeutsche Kabelwerke, Aktiengesellschaft, Neuköln, shows that this company had net profits of 1,422,088.63 marks during the past business year. A dividend of 16 per cent was declared on the old issues of shares and 10 per cent on the new issues.

The Continental-Caoutchouc und Gutta-Percha Compagnie, Hanover, has opened a warehouse for the sale of raincoats at 76 Kaiser Wilhelmstrasse, Hamburg.

The Norddeutsche Gummi- und Guttapercha-warenfabrik, formerly Fonrobert & Reimann, Berlin, reports that it will be unable to pay a dividend for the past business year. Adverse rates of exchange, higher wages and an increase in the cost of coals, are the reasons. The year before it was able to declare a dividend of 8 per cent.

The Phil. Penin, Gummiwarenfabrik, A.-G., Leipzig-Plagwitz, will raise its capital by 1,200,000 marks.

AUSTRIA

Statistics published by the Austrian Government for the fiscal year ended June 30, 1920, show that the foreign commerce of Austria for this period amounted in weight of commodities to 5,479,230 metric tons. Of this total, imports amounted to 4,502,170 metric tons, and exports to 977,060 metric tons. About 40 per cent, or over 4,500,000 metric tons came from Germany, while 20 per cent of the exports, or 190,320 metric tons were sent to Germany.

Austria imported a total of 590 metric tons of rubber goods of which 60 metric tons, value 45,000,000 Austrian crowns (average price for American dollar during November, 1920, was 317 crowns) came from Germany. Exports of rubber goods to all countries amounted to 730 tons, of which 60 tons, value 50,000,000 Austrian crowns went to Germany.

A preliminary report for the calendar year 1919 covering the boot and shoe industry in 161 Canadian plants has been prepared by the Dominion Bureau of Statistics. There were 183,193 dozen pairs of rubber heels and 103,052 dozen pairs of rubber and composition soles produced, the cost values of which, delivered at the factory, were respectively, $235,276 and $395,625.

FOREIGN TARIFFS

PERU

On March 16, 1921, the payment of the Peruvian export duty on rubber gum was suspended in the Department of Madre de Dios until June 30, 1921. The export duty on rubber is levied at the rate of 8 per cent ad valorem, with the exception of that from Putamayo, where it is only one-half of that amount.

FRENCH AFRICA

A decree of January 12, 1921, fixes the export duties on rubber at 10 per cent ad valorem.

BRITISH INDIA

The revised tariff valuations for import duties for 1921 as covered by Notification No. 8973 issued by the Department of Commerce of the Government of India includes the following: Rubber tires for motors and motorcycles, and rubber tubes for tires, and other manufactures of rubber, not otherwise specified, are dutiable at 7½ per cent ad valorem.

AUSTRIA

An Austrian decree dated December 28, 1920, makes important changes in import and export permits. Import license is required for wares of india rubber of all kinds, not including waste, paste, pieces of used ware, threads and sheets. Export license is required for india rubber waste, old used pieces of india rubber wares.

VENEZUELA

On February 10, 1921, the Venezuelan Ministry of Finance passed three resolutions amending the tariff law which went into effect April 1.

The first resolution abolishes the tariff item, evidently to eliminate duplication: No. 901. Wire, insulated or not, for electrical installations (see Tariff No. 825), duty—5.00 bolivars per kilo.

The second resolution makes the following changes in classification: No. 268. Tubes or conduits, of rubber, not otherwise specified. (Formerly: Tubes or conduits, of rubber, more than 15 millimeters in diameter, 0.75-bolivar per kilo.) No. 269. Tubes or conduits, of rubber, less than 15 millimeters in exterior diameter. (Formerly: Tubes or conduits, of rubber, less than 15

millimeters in diameter, 2.50 bolivars per kilo); having a duty, respectively, of 2.50 and 1.25 bolivars per kilo.

The third resolution provides for new classifications and duties on canvas hose, rubber hose covered with cloth or bound with wire at 75-bolivar per kilo.

CHILE

In the April issue readers were advised that it was proposed that tires should be exempted from an increase in custom tariff rates. The law of February 23, 1921, exempts rubber tires for automobiles, both solid and pneumatic, from increase in import duty.

METHOD OF ESTIMATING DUTY ON PENS IN CHILE

The point is removed from one fountain pen when a shipment is received in Antofagasta, Chile, weighed separately and the weight of the entire shipment is calculated from that one point. On repeat shipments where the weight of the pen point is on file, this is not necessary, and reduces the liability to damage incurred by the removal of points. If the point were not removed the whole pen would be weighed and duty assessed on the entire pen at the rate leviable on the gold point. When separated, the stocks are dutiable at the rate for manufacturers of rubber, 2.50 pesos per kilo, or about 41 cents per pound; while the points are dutiable at the rate of 0.10 peso per gram, or $16.56 per pound.

STATUS OF THE BERGOUGNAN COMPANIES

The "slack-off" in the motor trade has had its effect on the French tire manufacturers, no less than their British and American competitors, and all have had to fit themselves to circumstances. A considerable reduction of output has been arranged by the Bergougnan Co., of Clermont-Ferrand, which will continue until business resumes the normal. Varying activity is reported from the firm's subsidiary branches. The Italian branch, whose factory was seized by the workmen and run for a time on "Soviet" principles, passed through a period of chaos and two months' subsequent idleness. It is now back in the hands of the company, but the loss sustained is estimated at 20,000,000 francs.

The Belgian company, which was formed in the early part of 1920, has not yet commenced production. However, it is expected to start working within the next few months. The capital, which is eventually to be 20 millions of francs (half of which provided by the Empain group of chemical companies), has had only four millions subscribed up to the present.

The American branch at Trenton, New Jersey, is operating on a very much restricted scale and is considerably inconvenienced by the general crisis in trade, the lower sale prices and the high rate of American exchange.

A resumption of export sales activity by the Moscow branch is anticipated shortly. The factory has not suffered during the troubles, but entirely free trading relations have not yet been established.

In regard to the parent company, its accounts as of September 30, 1920, show total assets of 54,000,000 francs, with liabilities 39,000,000 francs. The general meeting of December 11, 1920, decided to pay a dividend of 60 francs per share, which amounted to nearly 11,000,000 francs.—*The India Rubber Journal,* London.

BURMA'S RUBBER TRADE

The rubber export trade of Burma is constantly growing. Although the total quantity exported in 1919-20, 4,924,000 pounds, increased 18 per cent over the shipments of the previous year, 4,149,000 pounds, the value declined. The bulk of this product went to the United Kingdom in 1919-20. Burma's trade with the United States included raw rubber to the value of $46,623 and $13,660 in the fiscal years 1918 and 1919, respectively. Imports of rubber goods from the United States were $18,538 in 1918; $11,292 in 1919 and $25,398 in 1920.

THE RUBBER TRADE IN THE FAR EAST

By Our Regular Correspondent

MALAYA

THE QUESTION of further reduction of output to 50 per cent is occupying planters' minds at present. While many hope the plan will go through, not a few think that nothing will come of it. Many small holdings have been forced to shut down and others have had to restrict output by one-half without waiting for legislation. Recent statistics show that receipts of native-grown rubber at Singapore have fallen by 60 per cent. So far only one European-owned estate has stopped tapping altogether, although reports indicate that others feel the need of such measures.

Opinion concerning the 50 per cent reduction is divided. Many who oppose it do so from the idea that such restriction would double the cost of production. In a letter to the *Straits Times,* W. M. Sime explains that with half crop the cost of production is really only 10 cents, Straits currency, a pound higher than with full crop.

Other opponents, mainly the strong companies, believe that nature should take its course and that the problem should be solved by the survival of the fittest. This is a very heartless view, and if put into effect it would by no means solve the problem. To be sure, the shutting down of many small estates would bring about a temporary reduction of output sufficient to send prices up. However, it is to be expected that the wealthier companies would seize the opportunity of acquiring additional rubber areas at very low prices, and would push the exploitation of their estates when rubber prices went up, and within a short time over-production and low prices would again prevail.

There is, therefore, the view that the supply of rubber must be controlled. Recently there appeared in the *Financier* an analytical survey of the problem and practical suggestions by one signing himself "Kidah." The following are some of the suggestions:

Reduction of costs by grouping together estates in the same district whenever possible.

Amalgamation of companies according to such groups.

Establishment of central warehouses in the chief distributing centers in Malaya, Ceylon and the Netherlands East Indies.

Complete control of distribution from these centers.

Decrees of British and Dutch colonial governments prohibiting the opening up of new lands for the time being.

The output would be dealt with as follows:

Immediate restriction of output by 50 per cent; companies or owners having only 50 per cent of their land in full bearing to restrict by 25 per cent.

When the price of rubber went above 2*s.* per pound, output to be restricted by 33 1/3 per cent. At 2*s.* 6*d.*, reduction to be 25 per cent until rubber touched 3*s.* 6*d.*, when full production or 90 per cent of full production should be resumed. As soon as the price dropped below 3*s.*, the 25 per cent restriction should be adopted again.

NEW INDUSTRIES

The discouraging conditions in the rubber industry have at last aroused Malaya to the danger of centering on only one or two crops, and the local government is endeavoring to encourage the cultivation of other crops, as sugar. It has also been suggested that attention be given to food crops, oil palm, ground nuts, rozelle fiber, etc.

The rubber slump has also opened the eyes of many to the fact that Malaya may have potential rivals in the other rubber-producing countries. Thus a correspondent of the *Malayan Tin & Rubber Journal,* wishes to know if serious efforts are being made in the Philippines to cultivate rubber. The writer is of opinion that should the Philippines be suitable for rubber cultivation Americans would not hesitate to spend the necessary money to open up the country and within a few years the islands would prove a serious menace to Malaya.

PERSONAL MENTION

F. Zech, rubber buyer for Fred Stern & Co., New York, N. Y., and Stern & Knowles, London, England, was tendered a dinner in Singapore late in February by friends, almost all of them connected with the rubber business, prior to leaving on a trip to Europe and the United States. A novel souvenir was provided for Mr. Zech in a sheet of pale crêpe bearing the signatures in copying ink of all those present.

CEYLON

Interesting data were given in the annual report presented at a recent meeting of the Ceylon Chamber of Commerce at Colombo.

Ceylon's industries, with the exception of coconut oil and copra, suffered from the general trade depression prevailing everywhere. The Government's offer to set aside 10 million rupees to aid tea and rubber estates was withdrawn. Estates were also hard hit by the high price of rice and it has been calculated that tea and rubber estates alone suffered a loss of 24 million rupees from this cause.

The total exports of rubber amounted to 87,296,356 pounds, and had voluntary restriction not been undertaken toward the end of the year, exports would have reached about 95 million pounds. Comparative figures for the years 1920 and 1919, with the countries of destination, follow:

	1919 Pounds	1920 Pounds
To United Kingdom	32,973,661	44,717,774
America	66,404,506	38,814,178
Europe	473,303	2,499,619
Australia	270,567	891,464
Japan	267,427	326,345
Other countries	3,373	46,976
Totals	100,392,831	87,296,356

America led in 1919 with 65 per cent of the exports, but dropped to second place, with 44 per cent in 1920. England, which in 1919 had taken 33 per cent of the total exports, stood first in 1920, her share being 51 per cent. Shipments to Europe showed an increase of 2,026,316 pounds principally to Germany, France and Italy.

Particulars relating to rubber offered at the local auctions during the last five years, follow:

	Pounds	Average Price Per Pound, Rupees
1916	24,675,206	1.79
1917	23,039,670	1.49
1918	20,869,795	....
1919	37,927,220	1.00
1920	36,078,693	0.70

For producers, 1920 was a very disappointing year. During January prices were steady with pale crêpe and No. 1 ribbed sheet selling at rupees 1.10 a pound; clean brown scrap crêpe at 95 cents, and curly scrap at 70 cents. However, prices declined until at the end of the year pale crêpe stood at 48 rupee cents (rupee—about 32 cents, United States currency, at normal rate of exchange); ribbed sheet 38 cents, clean brown scrap crêpes 30 cents and curly scrap 23 cents. These prices give an average well under the cost of production to most producers.

Recent inquiries show that while European-controlled estates in Ceylon are widely supporting the scheme for reducing output by 25 per cent, a large number of Ceylonese who own small rubber estates have failed to come into line. There are a number of these small acreages planted to rubber, the total area being no less than 40,000 acres. So far, little interest has been taken in the Malayan plan for compulsory restriction by 50 per cent. However, it is possible, that owing to the attitude of the Ceylonese, interest in this scheme will grow, particularly if it is adopted in Malaya.

LOCAL USES FOR RUBBER

An editorial in *The Weekly Times of Ceylon* mentions the various uses to which rubber has been put locally. Several estates are making and selling scrap rubber soles for boots and shoes. One planter is experimenting with scrap rubber on his cart roads. Locally made rubber studs to prevent windows from rattling are not unknown. A well-known proprietor has used his scrap rubber extensively on stairs, windows and doors of his bungalow.

CEYLON AND THE LONDON EXHIBITION

Ceylon's representation at the forthcoming exhibition will be divided into the following classes: 1. Crêpe; 2. Unsmoked sheet; 3, Smoked sheet; 4. Block; 5. Scrap Crêpe No. 1; 6. Clean curly scrap; 7. Any smoke cure.

NETHERLANDS EAST INDIES

While the stronger rubber concerns in the Netherlands East Indies have been able to carry through, there are many weak estates that are in difficulties. It is expected that in consequence there will be opportunities for securing good lands at reduced rates. This seems to be particularly true of Sumatra, East and West Coast, where many concessions are in the hands of those lacking either the capital or the desire to cultivate them.

Local planters are not enthusiastic over output restriction, and the big concerns particularly are keeping out of the movement. J. N. Burger, manager of various Dutch rubber-planting concerns, considers that efforts should rather be centered on reducing the cost than the output of rubber. In his opinion the present low market price is sufficient inducement to clear the accumulated stocks of rubber.

Sumatra has adopted a wait-and-see policy with regard to restriction. The movement in Malaya is being carefully observed and action here will be influenced by results obtained there. The expressed opinion is that output reduction can better be judged in Europe than in the lands of production, since there are other factors, outside of the East, that contribute in great part to the present crisis.

The rumors of English efforts to get local producers to join a syndicate that would centralize the sale of rubber and fix minimum prices, are not without a basis of fact. The opinion in certain quarters is that a majority of the planters would be willing to cooperate; however, it seems probable, that certain influential producers would be opposed to the movement.

NEW HEVEA DISEASE

In the *Archief voor de Rubbercultuur*, P. E. Keuchenius describes a new disease of *Hevea brasiliensis*, found in Malaya and the East Coast of Sumatra, though not in Java. The bark of infected trees is quite dry, can easily be removed and shows concentric bursts. In older cases, the bark gradually drops off and the concentric circles appear as typical rosettes. When the cork layer is scraped off, a sepia discoloration is found; this area is very full of sap and is sometimes attacked by borers. It is said that the disease is not dangerous as it never attacks the cambium. While the cause is not definitely known, it is certainly a disease of infection, originating in superficial wounds, and seems to be due to mould.

FRENCH INDO-CHINA

An official report states that under a decree of November 9, 1920, issued by the Governor-General of Indo-China, a subsidy of 450,000 piastres is granted to the rubber planters of French Indo-China in regard to their exports for the year ended March 31, 1921.

The decree contains a clause to the effect that if a customs duty is placed in France upon the importation of foreign rubber, the subsidy will be reduced proportionally by the amount of that duty. Furthermore, if the value of rubber per kilo on the London market exceeds the exchange value of the piastre by two francs, the payment of the subsidy will be suspended entirely. One quarter of the present subsidy will be borne by the Government of Cochin-China, where most of the rubber plantations are located, and the remainder by the Government of Indo-China.

There is a real need for government aid, for the combined effects of falling prices, abnormally high rate of the piastre and the high cost of labor make exploitation impossible. Although most planters need help, there are a certain number fortunate enough to be favorably located and able to turn out satisfactory dividends.

Recent Patents Relating to Rubber

THE UNITED STATES

GRANTED MARCH 1, 1921

NO. 1,369,766 Rubber shaving-cup with soap-containing orifice. L. A. Amis, Muskogee, Okla.
1,369,767 Soft rubber lather-cup with massage projections on bottom. L. A. Amis, Muskogee, Okla.
1,369,771 Rubber heel. H. L. Beal, Brookline, Mass.
1,369,851 Hose clamp. A. P. Swaidmark, assignor to Universal Industrial Corporation, both of Hackensack, N. J.
1,369,868 Golf ball and similar article. G. C. Worthington, Elyria, Ohio.
1,369,931 Storage battery. H. McCreary, Youngstown, Ohio.
1,369,992 Billiard table having bed cloth comprising, in a single structure, a rubberized cotton warp back, and a wool top interwoven with said back, completely inclosing said warp. J. Turner, Dorchester, Mass.
1,370,043 Dirigible balloon. R. A. D. Preston, assignor to The Goodyear Tire & Rubber Co.—both of Akron, Ohio.
1,370,065 Rubber protector for the soles and heels of footwear. H. T. Stephens, London, Eng.
1,370,066 Garter. S. W. Stern, Brooklyn, N. Y.
1,370,128 Inflating coupling. H. P. Kraft, Ridgewood, N. J., assignor to A. Schrader's Son, Inc., both in Brooklyn, N. Y.
1,370,168 Windshield cleaner. J. J. Tracy, Cleveland, Ohio.
1,370,170 Stopper plug. L. Ullman, New York, N. Y.
1,370,178 Valve for toy balloons. H. Albert, assignor to Art Toy & Stamping Works, Inc.—both of New York, N. Y.
1,370,280 Tire. O. Buse, Brooklyn, N. Y.
1,370,289 Hose coupling. R. D. Crippen, San Diego, assignor of one-half to G. B. Sheldon, La Mesa, both in Calif.
1,370,316 Diver's suit. H. Houdini, Brooklyn, N. Y.
1,370,395 Combined lock-sleeve and dust cap for valve stems. W. M. Anderson, Minneapolis, Minn.
1,370,437 Apparatus for testing battery jars. A. E. Gustafson, Centerville, S. D.
1,370,442 Cushion tire. H. M. Henry, Pottstown, Pa.

GRANTED MARCH 8, 1921

1,370,525 Paper box or carton for tire valves. E. Eisenkraft, assignor to A. Schrader's Son, Inc., both in Brooklyn, N. Y.
1,370,568 Abdominal supporter. M. E. Wagner, Atchison, Kans.
1,370,603 Combination valve cap and tire deflator. W. P. McComb, Conroe, Tex.
1,370,678 Tire pressure gage. W. A. Allen, Yonkers, N. Y., assignor to A. Schrader's Son, Inc., Brooklyn, N. Y.
1,370,684 Windshield cleaner. J. Demand, New York, N. Y.
1,370,709 Inking roller with surface of soft rubber. F. Smith, Philadelphia, Pa.
1,370,714 Auto tire. J. Strzyczkowski, New York, N. Y.
1,370,727 Rug holder. W. O. Bloom, West Boylston, Mass.
1,370,730 Pedal cover. T. C. Carver, Milwaukee, Wis.
1,370,797 Shoe sole stiffening device. H. C. Egerton, Passaic, N. J.
1,370,798 Reinforced gripping rubber shoe sole. H. C. Egerton, Ridgewood, N. J.
1,370,799 Arch supporting insole. H. C. Egerton, Ridgewood, N. J.
1,370,909 Windshield cleaner. J. Pederson, Bridgeport, Conn.
1,370,910 Windshield cleaner, J. Pederson, Bridgeport, Conn.
1,370,977 Tire lock applicable to the inflating valve. H. G. Levy, San Francisco, Calif.
1,370,988 Pressure indicator for pneumatic tires. W. M. Myers, St. Joseph, Mo.
1,371,040 Shoe heel. L. McMillan, Wilmington, N. C.
1,371,089 Combined tire inflator and gage. L. N. Herring, Marshall, Minn.
1,371,097 Pneumatic tire protector. L. I. Jones, Bowling Green, Ohio.
1,371,186 Vehicle tire. J. Parrino, assignor of one-half to G. Di Girolamo—both of Buffalo, N. Y.
1,371,194 Amusement device employing balloons. D. Bird, New York, N. Y.
1,371,203 Inflatable gas bags for airplane safety device. J. R. Drumman and T. Mieczejeksi, Rosemont, W. Va.

GRANTED MARCH 15, 1921

1,371,236 Gas mask. W. C. Geer, N. S. Noble and E. S. Teed—all of Akron, Ohio, assignors to The B. F. Goodrich Co., New York, N. Y.
1,371,274 Hose clamp. J. L. Thompson, Centerville, Iowa.
1,371,339 Detachable shoe heel pad. L. Arntz and B. Walters, both of Des Moines, Iowa.
1,371,363 Windshield wiper. A. F. Gillet, assignor to Jubilee Manufacturing Co.—both of Omaha, Nebr.
1,371,398 Spring heel with rubber lift overlapped by spring plate. B. F. Schirmer, New York, N. Y.
1,371,472 Sponge rubber cushion tire. T. W. Costello, San Francisco, Calif.
1,371,574 Tire lifter. E. D. Redfield, Hartford, Conn.
1,371,672 Pneumatic tire. A. F. Fairchild, Delavan, Wis.
1,371,676 Demountable rim for tires. W. H. Fox, Minneapolis, Minn.
1,371,708 Swimming glove. M. Schreiner, New York, N. Y.
1,371,763 Nasal Douche. J. H. Heron, Denver, Colo.
1,371,804 Manufacture of artificial fur comprising a fabric base, a coating of somewhat elastic vulcanizable material on the face side having a large number of hairs stuck into it endwise, said coating being vulcanized to hold the ends of the hairs. H. T. Nowell, New Rochelle, N. Y.
1,371,807 Tire tube. T. A. Philpott, Columbus, Mont.
1,371,919 Vermin-proof combined mattress and spring composed of superposed inflatable sections of vulcanized comparatively hard rubber fabric and soft rubber, respectively, vulcanized together. E. P. Mahony, New York, N. Y.

GRANTED MARCH 22, 1921

1,372,004 Pacifier. C. C. Borchers, Chicago, Ill.
1,372,021 Process for the production of artificial patent leather and product thereof. H. J. Haon, Newburgh, N. Y., assignor by mesne assignments, to E. I. du Pont de Nemours & Co., Wilmington, Del.
1,372,089 Nose shaper and surgical supporter. A. D. Rostow, Summit, N. J.
1,372,101 Urine container and supporter. T. T. Snow, Sioux Falls, S. D.
1,372,115 Closure device with ball valve. T. H. Bennis, Brooklyn, N. Y.
1,372,116 Tire. H. Besser, Alpena, Mich.
1,372,213 Drinking fountain attachment for bibbs or faucets. F. P. Williams, assignor of one-fourth to A. Beauvais—both of Detroit, Mich.
1,372,230 Demountable rim for tires. R. L. Jenkins, assignor to G. L. Christian, Jr.—both of Richmond, Va.
1,372,260 Auxiliary balloon for flying machine and inflating tank therefor. G. W. Wilkin, Grangeville, Idaho.
1,372,284 Tire inner liner. F. C. Doss, Atlanta, Ga.
1,372,322 Bottle cap. R. Stock, Sandusky, Ohio.
1,372,412 Cripple's washing device with suction cup. W. L. Finkhousen, Van Wert, Ohio.
1,372,417 Pneumatic tire. F. V. Gardner, Cincinnati, Ohio.
1,372,428 Endless belt with endless rubber core, a strip of rubber-impregnated fabric having diagonally cut and overlapping ends and being rolled around the core, and a rubber outer cover. A. M. Hardy, Bowmanville, assignor to The Goodyear Tire & Rubber Co. of Canada, Limited, Toronto—both in Ontario, Canada.
1,372,505 Sanitary mattress attachment. C. Hanson, Wittenberg, Wis.
1,372,517 Adjustable rubber pad, ferrule, or tip for walking sticks, crutches, etc. F. King, Carmarthen, Wales.
1,372,528 A collapsible boat composed of inflatable fabric members. F. Marcovsky, Duquesne, Pa.
1,372,587 Tire filler. H. A. Andresen, Chicago, Ill.
1,372,608 Fountain pen with transparent tube showing through lengthwise groove to indicate ink content. R. de Echevarria, Santa Cruz, Philippine Islands.
1,372,641 Spring wheel with pneumatic tire. M. N. Clay, Morgan City, La.

THE DOMINION OF CANADA

GRANTED MARCH 1, 1921

208,914 Elastic Tire. Fridtjov Anderson, Kristiania, Norway.
208,929 Windshield cleaner. V. H. Chritin, Toledo, Ontario.
208,930 Two-part rubber heel. W. H. Clark, Toronto, Ontario.
208,951 Cushion Wheel. P. H. Dorsey, Algiers, Louisiana, U. S. A.
208,962 Windshield cleaning apparatus. W. M. Folberth, Cleveland, Ohio, U. S. A.
208,975 Windshield cleaner. F. S. Gold, Toronto, Ontario.
208,989 Blow-out patch. W. V. Hayes, New York, U. S. A.
209,024 Pencil eraser. H. Moore, Brooklyn, New York, U. S. A.
209,060 Washing device. P. Sporer, Chicago, Ill., U. S. A.

GRANTED MARCH 8, 1921

209,322 Laminated sheet of rubber and chemically treated, parchmentized vegetable fibre. The Diamond State Fibre Co., Bridgeport, assignee of A. M. E. Strijffert, Norristown—both in Pennsylvania, U. S. A.

GRANTED MARCH 15, 1921

209,418 Vaginal douche. C. W. De Long, Live Oak, Florida, U. S. A.
209,435 Boot and shoe lift. T. A. Gambino, Providence, Rhode Island, U. S. A.
309,440 Rupture appliance, with rubber pad. A. L. Hatzan, Niagara Falls, Ontario.
209,537 Rubberized fabric steam line shields for cables. The Goodyear Tire & Rubber Co., assignee of R. Hazlett Upson—both of Akron, Ohio, U. S. A.

GRANTED MARCH 22, 1921

209,612 Nursing bottle attachment to prevent collapse of nipple. L. D. Clark, Waterville, Maine, U. S. A.
209,615 Combined dental syringe and mirror. J. E. Craig, Gary, Ind., U. S. A.
209,686 Elastic stocking. S. Mohink, Pawtucket, Rhode Island, U. S. A.
209,725 Gutta percha or gutta percha compound insulating medium for cables with self-inductive load. K. W. Wagner, Berlin-Lankwitz, Germany.
209,792 Obstetrical bandage with inflatable pad in center. T. W. H. Young and T. H. Kendrey, assignee of a half interest—both of Peterborough, Ontario.

THE UNITED KINGDOM

PUBLISHED FEBRUARY 16, 1921

155,325 Pneumatic tire. A. T. Milne-Smith, Laurel Cottage, Fox Hill, Upper Norwood, London.
155,348 Resilient work-support with inflatable casing for leather-working machines. A. S. Jones, Pendower, Wrexham, Denbighshire, and Turner Tanning Machinery Co., Peabody, Mass., U. S. A.
155,362 Sectional inner tube with individual valves for sections. S. Mack, 29 Elie House Road, Mutwal, Colombo, Ceylon.
155,393 Latex spout. P. J. Magoris, 16 King street, Portman Square, and I. V. Wart, 3 Torrens street, City Road, both in London.
155,421 Bottle stopper with rubber washer. C. Buchan, 3 Lygon Road, Edinburgh.
155,465 Reinforced pneumatic tire. G. R. Granzow, Thompson, Iowa, U. S. A.
155,479 Inflatable artificial bait. M. White, 15 Dundonald Road, Glasgow.
155,505 Tire interliner containing semi-liquid puncture-closing composition. H. Wade, 111 Hatton Garden, London.
155,512 Sock-suspenders. J. K. Seymour, 116 Lake avenue, Elyria, Ohio, U. S. A.

Chemical Patents will be found on page 581. Machinery Patents on pages 584-585

PUBLISHED FEBRUARY 23, 1921

155,716 Window buffer. J. Holloway, 4 Wesley Road, High Road, Leyton, London.
155,734 Sock-suspenders. T. Lindauer, 42 Faubourg du Temple, Paris.
155,737 Cushion tire. D. Maggiora, Villa le Fontanelle, Firenze, Careggi, Italy.

PUBLISHED MARCH 2, 1921

155,974 Toy airplane actuated by elastic band. R. N. Bullock, Pendean, Forest avenue, Forest Hall, Northumberland.
156,001 A rubber core to replace the air-tube in an ordinary tire cover. S. G. Wood, 64 Milton Park, Highgate, London.
156,043 Tire attachments to rims. E. E. W. Butt, 410 Mansion House Chambers, Queen Victoria street, London.
156,074 Catamenial appliance. E. Kuhn, 48 Viktoriastrasse, Schlachtensee, near Berlin. (Not yet accepted.)
156,102 Respiratory appliance. R. van der Heide, 43 Wielandstrasse, Charlottenburg, Berlin. (Not yet accepted.)
156,205 Solid or cushion tire reinforced with strips of frictioned fabric. The Goodyear Tire & Rubber Co., 1144 East Market street, assignee of J. E. Hale, 862 West Exchange street—both of Akron, Ohio, U. S. A. (Not yet accepted.)
156,239 Spring wheel with pneumatic rubber ring, or similar cushions. Dobbins Wheel Co., 717 First National Bank Building, Denver, Colorado, assignee of T. C. Dobbins, Huntington Park, Calif.—both in U. S. A. (Not yet accepted.)
156,240 Spring wheel with rubber tire. Dobbins Wheel Co., 717 First National Bank Building, Denver, Colo., assignee of T. C. Dobbins, Huntington Park, Calif.—both in U. S. A. (Not yet accepted.)
156,256 Garment suspenders. J. Pabst, 46 Gessneralle, Zurich, Switzerland. (Not yet accepted.)
156,314 Cushion tires. T. P. Jones, 11 Paul Nel street, Hillbrow, Johannesburg, South Africa.
156,453 Corsets with elastic bands. R. M. Hahn, 6 Great Castle street, London.
156,461 Finger, stamp or envelope moisteners. G. W. Jones, 1443 King street, West Toronto, Canada.
156,465 Connected upper and lower garters to be worn above and below the knee, respectively. C. Baring, Park Place, Englefield Green, Surrey.
156,568 Construction of pneumatic tire cover to permit attaching to rim by cement. A. Schipke, 18 Lauenburgerstrasse, Wilmersdorf, Berlin. (Not yet accepted.)
156,584 Construction of heels for attaching removable rubber lifts. H. F. W. Stedler, Hohenhostel, Deister, Hanover, Germany. (Not yet accepted.)

PUBLISHED MARCH 16, 1921

156,650 Cushion tire. H. Debor, 55 Zielstattstrasse, Munich, Germany. (Not yet accepted.)
156,770 Hose coupling. J. M. Oden, 253 Tillary street, Brooklyn, N. Y., U. S. A. (Not yet accepted.)
156,786 Boxes for holding tire valve caps. A. Schrader's Son, Inc., 783 Atlantic avenue, Brooklyn, N. Y., assignee of H. P. Kraft, 219 Godwin avenue, Ridgewood, N. J.—both in U. S. A. (Not yet accepted.)
156,787 Wheel tires. A. Schrader's Son, Inc., 783 Atlantic avenue, Brooklyn, N. Y., assignee of H. P. Kraft, 219 Godwin avenue, Ridgewood, N. J.—both in U. S. A. (Not yet accepted.)
156,788 Diving dress stiffened with pneumatic tubes. A. Schrader's Son, Inc., 783 Atlantic avenue, Brooklyn, assignee of M. C. Schweinert, 42 Riverside Drive—both in New York, U. S. A. (Not yet accepted.)
156,789 Tire valves. A. Schrader's Son, Inc., 783 Atlantic avenue, Brooklyn, assignee of M. C. Schweinert, 42 Riverside Drive—both in New York, U. S. A. (Not yet accepted.)
156,790 Wrench for tire valves. A. Schrader's Son, Inc., 783 Atlantic avenue, Brooklyn, N. Y., assignee of H. P. Kraft, 219 Godwin avenue, Ridgewood, N. J.—both in U. S. A. (Not yet accepted.)
156,791 Tire valve. A. Schrader's Son, Inc., 783 Atlantic avenue, Brooklyn, N. Y., assignee of H. P. Kraft, 219 Godwin avenue, Ridgewood, N. J.—both in U. S. A. (Not yet accepted.)
156,792 Dust cap for tire valves. A. Schrader's Son, Inc., 783 Atlantic avenue, Brooklyn, assignee of M. C. Schweinert, 42 Riverside Drive—both in New York, U. S. A. (Not yet accepted.)
156,793 Attachment of valve stem to tire tubes. A. Schrader's Son, Inc., 783 Atlantic avenue, Brooklyn, N. Y., assignee of H. P. Kraft, 219 Godwin avenue, Ridgewood, N. J.—both in U. S. A. (Not yet accepted.)
156,794 Dust cap for tire valves, etc. A. Schrader's Son, Inc., 783 Atlantic avenue, Brooklyn, N. Y., assignee of E. van A. Myers, 77 Evergreen Place, East Orange, N. J.—both in U. S. A. (Not yet accepted.)
156,795 Tire valves. A. Schrader's Son, Inc., 783 Atlantic avenue, Brooklyn, N. Y., assignee of H. P. Kraft, 219 Godwin avenue, Ridgewood, N. J.—both in U. S. A. (Not yet accepted.)
156,847 Tire with sponge rubber interliner. S. Midzushima, 30, 9-Chome, Kobiki-Cho, Kyobashi-Ku, Tokio.
156,886 Detachable rubber heel. A. Powell, 26 Rushton Road, Cobridge, Stoke-on-Trent.
156,967 Wedge-shaped vulcanite golf appliance held between the teeth and connected to player's clothing by tapes or elastic for teaching a player to avoid head movement when making a stroke. S. Hickman, 12 Bernard Gardens, Wimbledon, London.
156,989 Solid tire with tubular steel hoop embedded therein near base. T. H. Rushton, 31 Southbrook Road, Lee, London.

GERMANY

PATENTS ISSUED, WITH DATES OF ISSUE

335,631 (June 13, 1920.) Pneumatic tire attachment. Saturn-Luftreifen-Gesellschaft Eichler & Co., Hanover.
335,632 (November 22, 1916.) Cushion tire. Emil Schätzle and Caroline Seraphine Schätzle, née Froideveaux, Waldenburg, Switzerland. Representative: Emil Schätzle, Weil b. Lörrach, Baden.
335,857 (September 11, 1919). Resilient tire. Dr. Alfred Amsler, Rheinbuhl, Shaffhausen, Schweiz; represented by Dr. L. Gottsche, Berlin, W. 8.
335,896 (June 12, 1919.) Resilient tire; Dr. Hermann Pünig, Neuplstr. 26-27, Münster i. W.
335,897 (August 29, 1919). Resilient tire. Paul Kutter, Magdeburgerstr. 5, Brandenburg a. H.

TRADE MARKS

THE UNITED STATES

SERIAL NUMBERS PUBLISHED MARCH 10, 1921*

NO. 96,277 Representation of a rubber nipple having a red band at edge—rubber nipples. Revere Rubber Co., Providence.
123,887 AIR LOCK—air valves for tires, pneumatic cushions, life-preservers, etc. The Griffith Manufacturing Co., Boston.
127,085 Representation of a globe surmounted by a spread eagle and encircled by a ribbon scroll the globe and scroll bearing the words EAGLE BRAND RUBBER TOYS—toy balloons. The Eagle Rubber Co., Ashland, Ohio.
129,381 GOODRICH—druggists' and surgical sundries. The B. F. Goodrich Co., New York.
131,951 Representation of label showing children at play with balloons and the word FAULTLESS—toy balloons. The Faultless Rubber Co., Ashland, Ohio.
135,127 EVERFLO—stylographic pencils and fountain pens. I. J. Bissell, Grand Rapids, Mich.
137,465 AKRON—belting, hose and packing. The B. F. Goodrich Co., New York.
137,474 GOODRICH—rubber or rubber composition. The B. F. Goodrich Co., New York.
138,447 EVERDA—fountain pens, etc. S. J. Meyerpeter, Chicago.
139,714 DIADEM—rubber belting and hose, rubber and composition packing and gaskets. E. Z. Jefferson, Pittsburgh, Pa.
139,907 TOOTHEX TOOTH EXERCISE GUM—chewing gum. Pirodent Corporation, Detroit.

SERIAL NUMBERS PUBLISHED MARCH 18, 1921*

120,403 BETTY BATES enclosed in a conventionalized oval—rubber and leather boots and shoes, rubber boots, etc. A. J. Bates & Co., Inc., New York.
126,468 GOODRICH—waterproof clothing and footwear. The B. F. Goodrich Co., New York.
131,503 NONAIL—waterproof baby pants. Rubberized Sheeting & Specialty Co., Inc., New York.
138,055 LISTER-SPEARMINT—chewing gum. Listerated Gum Corporation, New York.

SERIAL NUMBERS PUBLISHED MARCH 24, 1921*

121,279 "RED SPOT" above a red spot—brake linings and clutch facings. J. R. Kelso, Trenton, N. J.
129,382 GOODRICH—valves, ball valves, dredging sleeves, emergency bands for pneumatic tires, floats, gas pipe, rings, hard and soft rubber connections for fluid conductors, belting, hose, machinery packing, non-adhesive tire repair materials, pump and regulator diaphragms, tire reliners, screen diaphragms for paper pulp vats, sheet diaphragms, pneumatic, solid or cushion tires, vacuum brake, diaphragms, etc., all made wholly of rubber or rubber combined with asbestos or fabric. The B. F. Goodrich Co., New York.
125,826 SEIBEL. Facsimile signature—pneumatic tires. Seibel Air-Spring Co., Inc., Phoenix, Ariz. (See THE INDIA RUBBER WORLD, February 1, 1920, page 345.)
137,473 GOODRICH—thread made of rubber. The B. F. Goodrich Co., New York.
138,975 DRIVE-ON! Sheet-rubber patches. E. T. Barker, Oakland, Calif.
139,474 RED W enclosed between representation of two posts connected at top and bottom by chains—raincoats. W. H. Redwine, Pittsburgh, Pa.
139,583 LAS-STIK TUBE PATCH, THE ORIGINAL PATCH WITH A S-T-R-E-T-C-H—fabric and rubber repair patches. Las-Stik Patch Manufacturing Co., Hamilton, Ohio.
140,158 BRITE MAWNIN—jar rings. Amboy Products Co., Inc., Chicago. (See description elsewhere in this issue.)

SERIAL NUMBERS PUBLISHED MARCH 29, 1921*

126,499 Representation of a stick of licorice and a Brownie-type figure—chewing gum. Wm. Wrigley, Jr., Co., Chicago.
132,661 SURE-ON—detachable treads or shoes of rubber and fibrous materials for use on pneumatic tires. Sure-On Tire Saver Co., Chicago.
132,903 Representation of a seal bearing the words WILLARD THREAD RUBBER, INSULATION and the letter W—storage batteries and parts thereof. Willard Storage Battery Co., Cleveland, O.
139,110 The word Cox combined with a sphinx and a pyramid above a rectangle—rubber tapes, webbing, hard rubber and vulcanized fiber, etc., all used for electrical insulating purposes. Albert J. Cox Co., Chicago.
140,177 The word SPIRALWEAVE superimposed above a keystone and two insulated wires—insulated wires and cables. Hazard Manufacturing Co., Wilkes-Barre, Pa.
141,780 'ORDER FROM HORDER'—rubber stamps. Horder's, Incorporated, Chicago.

*Notice of opposition must be filed with the Commissioner of Patents, Washington, D. C., within thirty days after this date.

TWO KINDS OF TRADE MARKS NOW BEING REGISTERED

Under the rules of the United States Patent Office, trade marks registered under the Act of February 20, 1905, are, in general, fanciful and arbitrary marks, while those registered under the Act of March 19, 1920, Section 1 (b), are non-technical, that is, marks consisting of descriptive or geographical matter or mere surnames. To be registered under the latter act, trade marks must have been used for not less than one year. Marks registered under this act are being published for the first time when registered, any opposition taking the form of an application for cancellation. The following list includes those of interest to the rubber trade published since the establishment of this procedure:

GRANTED MARCH 1, 1921

Under Act of February 20, 1905

139,998 JENCKES—textile fabrics in the piece for tire manufacture. Jenckes Spinning Co., Pawtucket, R. I.

Under Act of March 19, 1920, Section 1 (b)

140,024 INRGARD TIRE REINFORCEMENT, accompanied by representations of section of tire, interliner and inner tube overlapping each other beneath a section of interliner—tire reinforcements made of fabric and cement. The American Automobile Accessories Co., Cincinnati, O.

140,055 SCHMIDT'S ARCH HEEL and representation of heel—rubber, leather, and composition heels. M. C. Schmidt, Tacoma, Wash.

140,065 BOOTEE—lumbermen's fabric and rubber boots. United States Rubber Co., New Brunswick, N. J., and New York, N. Y.

RENEWALS

19,078 The monogram VZ—belting, hose and packing for machinery. Revere Rubber Co., Boston, Mass., assignor to Revere Rubber Co., a Rhode Island corporation.

GRANTED MARCH 8, 1921

Under Act of February 20, 1905

140,092 ONE-IN-ALL "IN THE RAIN"—waterproof coats and slickers, J. T. Caradine, St. Louis, Mo.

140,128 VULCO-CURED TUBE—inner tubes. The Gates Rubber Co., Denver, Colo.

140,191 SATURN—rubber and fabric belting. The Gutta Percha & Rubber Manufacturing Co., New York.

140,209 Section of belting showing copper thread—belting. The Rossendale-Reddaway Belting & Hose Co., Newark, N. J.

140,223 STAR—pneumatic and solid tires. The Star Rubber Co., Akron, O.

Under Act of March 19, 1920, Section 1 (b)

140,267 RUBBER HARDWARE—tire valves, dust caps, etc. The Dill Manufacturing Co., Cleveland, O.

140,294 PANAMA—garters. President Suspender Co., Shirley, Mass.

GRANTED MARCH 15, 1921

Under Act of February 20, 1905

140,311 Conventional design—belting, hose, packing, and belt lacings. C. O. Alexander, Philadelphia, Pa.

140,326 BENNIE SPRINGFIELD—pneumatic tires. Alexander Bennie & Co., Nashville, Tenn.

140,363 DRESCO—belting, hose, packing, and tires. Delaware Electric & Supply Co., Wilmington, Del.

140,364 SUPERTITE—Fountain pens, etc. De Witt-La France Co., Cambridge, Mass.

140,374 RUBBER ACE MASTER OF AIR—sponge rubber tire fillers. Elgin Rubber Ace Co., Elgin, Ill.

140,375 RUBBER ACE—sponge rubber tire fillers. Elgin Rubber Ace Co., Elgin, Ill.

140,376 MASTER OF AIR—sponge rubber tire fillers. Elgin Rubber Ace Co., Elgin, Ill.

140,382 FEDERAL—belting, hose, packing, tires, reliners, patches, washers, rings and balls. The Federal Rubber Co., Cudahy, Wis.

140,444 SYRA-CORD—tire casings or shoes and inner tubes. Syracuse Rubber Co., Inc., Syracuse, N. Y.

140,449 TIRETEX—woven fabrics in the piece for making tires. Thistle Cotton Mills, Inc., Ilchester, Md.

140,450 Representation of a tiger holding a tire encircling the words TIGER CLAW—tire patches. Tigers Claw Manufacturing Co., Detroit, Mich.

140,480 A Marathon runner—inner tubes. The Marathon Tire & Rubber Co., Cuyahoga Falls, O.

140,508 EVEREADY—ruberhose, and rubber and fiber hose, etc. Oxweld Acetylene Co., Newark, N. J.

140,531 RAINBOW—elastic webbing. The Russel Manufacturing Co., Middletown, Conn.

140,532 ELK—elastic webbing. The Russell Manufacturing Co., Middletown, Conn.

140,533 GIBRALTAR—elastic webbings. The Russell Manufacturing Co., Middletown, Conn.

140,534 SHAMROCK—elastic webbings. The Russell Manufacturing Co., Middletown, Conn.

140,535 ALLIGATOR—elastic webbings. The Russell Manufacturing Co., Middletown, Conn.

140,536 CHALLENGE—elastic webbings. The Russell Manufacturing Co., Middletown, Conn.

Under Act of March 19, 1920, Section 1 (b)

140,538 A white disk surrounded by a red band, and the words GOODYEAR CORD AKRON—rubber or rubber and fabric tires. The Goodyear Tire & Rubber Co., Akron, O.

GRANTED MARCH 22, 1921

Under Act of February 20, 1905

140,582 The letter C containing the letter X—tires and tubes. The Converse Rubber Shoe Co., Malden, Mass.

140,617 "SHIRLASTIC"—sanitary belts. I. B. Kleinert Rubber Co., New York.

140,618 KNICKERBOCKER—massage shower-bath sprays. Knickerbocker Manufacturing Co., Chicago, Ill.

140,677 SANSCO—infants stork pants and bibs. N. Scoville, St. Louis, Mo.

140,688 KIDALLS—overalls. United States Rubber Co., New Brunswick, N. J., and New York, N. Y.

Under Act of March 19, 1920, Section 1 (b)

140,714 MILLER—rubber sponges and sponge rubber. The Miller Rubber Co., Akron, O.

THE DOMINION OF CANADA

REGISTERED

28,028 UNIVERSAL—electric storage batteries, parts, and accessories. Universal Battery Co., Chicago, Ill., U. S. A.

28,078 Representation of a pen-nib bearing the words PEN-CORD—tires and tubes. W. A. F. Oakley, Hamilton, Ont.

28,131 SIMMS and the words SET IN RUBBER in an oval over the word SIMMS—brushes. T. S. Simms & Co., Limited, Saint John, N. B.

28,134 A maple leaf surcharged with the words C. V. E., LONDON, and underneath, the words TRADE MARK—motor accessories and auto-shop equipment. Canada Vulcanizer and Equipment Co., Limited, London, Ont.

THE UNITED KINGDOM

PUBLISHED JANUARY 5, 1921

403,629 Representation of a tire enclosing figure of a man standing beneath a tree—tire dressings, cement, and puncture-healing composition. George Spencer Moulton & Co., Limited, and Wood-Milne, Limited, 2 Central Buildings, Westminster, London, S. W. 1.

407,944 Representation of a pile of three tires with different treads, accompanied by the words HIGH PRESS RETREADS, DRICURE PROCESS—tires. The United Rubber Co., 141-143, Commercial Road, Peckham, London, S. E. 15.

PUBLISHED JANUARY 12, 1921

407,857 LIXUM—manufactured rubber and gutta percha goods not included in classes other than No. 40. The Greengate & Irwell Rubber Co., Limited, Greengate Rubber Works, Greengate, Salford, Lancashire.

407,858 LIXUM—hose and packing. The Greengate & Irwell Rubber Co., Limited, Greengate Rubber Works, Greengate, Salford, Lancashire.

408,439 Conventionalized representation of the sun's rays around a circle enclosing the word ABACUS arranged in a central acrostic, accompanied by the words, THERE IS SOME THING NEW UNDER THE SUN—fountain pens, etc. E. J. Hammond, 10 Chertsey Road, Leytonstone, London, E. 11.

409,163 PUNKHO—medium for closing tire punctures. F. S. Brereton, Felton Lodge, Boxmoor, Hertfordshire.

B409,422 RAYNOFF—waterproof clothing, etc. J. Mandleberg & Co., Limited, Albion Waterproofing Works, Cobden street, Pendleton, Manchester.

PUBLISHED JANUARY 19, 1921

407,148 Representation of a lightning flash and the word 'ECLAIR'—electrical insulating materials. John W. Shaw, Limited, 90 Broughton Lane, Strangeways, Manchester.

407,822 Representation of three round heels arranged in trifoil formation, with the monogram SRCO superimposed upon them—rubber heels and soles. Barnet Etkind, trading as The Sussex Rubber Co., 32 Houndsditch, London, E. 1.

408,251 ROTEX—rubber tobacco pouches. A. Oppenheimer & Co., 38 Finsbury Square, London, E. C. 2.

408,580 OAK—all rubber goods included in Class No. 40. Oak Tire & Rubber Co., Limited, 19 Dundas street, East, Toronto, Ont., Can.; address for service in the United Kingdom, care of H. Fairbrother, 30-32 Ludgate Hill, London, E. C. 4.

PUBLISHED JANUARY 26, 1921

401,184 Conventionalized Maltese cross wider than high, not to be used in red—chewing gum. William Wrigley Junior Co., 5 North Wabash avenue, Chicago, Ill., U. S. A.; address in the United Kingdom, care of Marks & Clerk, 57-58 Lincoln's Inn Fields, London, W. C. 2.

402,440 Representation of profile bust on disk, accompanied by the words CARDINAL WOLSEY—manufactured rubber and gutta percha goods not included in classes other than No. 40. Walker, Sons & Tyler, Limited, 31 King street, Leicester.

405,626 PHELVAN BRAND and a representation of the statue of a man strangling a snake, standing on a plinth bearing the name GOLIATH—tires and tiring material. The Manufacturers' Eastern Agency, 32 Apollo street, Bombay, India; address for service in the United Kingdom, care of G. F. Redfern & Co., 15 South street, Finsbury, London, E. C. 2.

408,086 ROTEX—hose and packing. A. Oppenheimer & Co., 38 Finsbury Square, London, E. C. 2.

409,366 ACE—hose and packing, asbestos goods in Class No. 50, etc. The Beldam Packing & Rubber Co., Limited, 29 Gracechurch street, London, E. C. 3.

409,937 A conventionalized monogram formed of the letter R reversed joined to W and R, with the word HYDE between—rubber and other goods included in Class No. 40. Redfern's Rubber Works, Limited, Dawson and Spring Bank streets, Hyde, Cheshire, and 75 Newman street, London, W. 1.

410,035 TOPAZ—sponge substitutes of rubber and spongy rubber goods not included in classes other than No. 40. Featheredge Rubber Co., 408 West Grand avenue, Chicago, Ill., U. S. A.; address for service in the United Kingdom, care of Francis Heron Rogers, Bridge House, 181 Queen Victoria street, London, E. C. 4.

410,196 LUKKIDUKKI—inflatable rubber toys. J. G. Franklin & Sons, Limited, 17 Colvestone Crescent, Dalston, London, E. 8. (See description in THE INDIA RUBBER WORLD, April 1, 1921, page 504.)

PUBLISHED FEBRUARY 2, 1921

B405,010 GRAPHO—fountain pens, ink and pencil erasers, rubber bands, etc. Grapho, Limited, 13 Lovell's Court, London, E. C. 4.

407,712 Representation of a label bearing the words LE REPNEU and a group of gnomes repairing tires and supporting one which has been repaired and branded LE REPNEU, accompanied by further text in French—tires and tubes, etc. Frederick William Farr, trading as The Hercules Tyre Co., Reclaim Works, 16 Henry street, Northampton.

408,146 SPRINGBOK—sock suspenders. John Patterson, Jr., The Scotch House, Wellington street, Aldershot, Hampshire.

408,196 SEMCO—inner tubes for automobile and motorcycle pneumatic tires. Semple Rubber Co., 112 Murray street, Trenton, New Jersey, U. S. A.; address for service in the United Kingdom, care of Herbert Haddan & Co., 31-32 Bedford street, Strand, London, W. C. 2.

PUBLISHED FEBRUARY 9, 1921

402,160 BOX-ALL—rubber heels, tips, and soles. Elijah Day & Sons, Limited, 462 Claremont Road, Rusholme, Manchester.

408,866 SALAMANDER beneath the representation of a salamander bearing a pen or pencil in its mouth—fountain and stylographic pens, etc. George Hyman Hudson, trading as G. H. Hudson & Co., 65-66 Basinghall street, London, E. C. 2.

409,094 NADATH—rubber heels. Arthur Powell, 26 Rushton Road, Cobridge, Stoke-on-Trent, Staffordshire.

409,298 HARMEN—tires, casings, and innner tubes. H. J. Menzies, Linden House, Langholme Road, East Boldon, Newcastle-on-Tyne.

410,350 WALPAD—rubber belts and belting. F. Reddaway & Co., Limited, Victoria Mills, Cheltenham street, Pendleton, Manchester, Lancashire.

PUBLISHED FEBRUARY 16, 1921

405,078 A triangle containing the monogram AR between the letters C and O—waterproof garments. Alfred Smith, trading as The Amazon Rubber Co., 31 Sackville street, Manchester.

405,581 PUSSY FOOT-PAD and the representation of a cat's foot-print within a circle—rubber soles and heels. Andrew Spiller, 31 Gunnersbury Lane, Acton, London, W. 3.

409,416 VICTAULIC—rubber packing. The Victory Pipe Joint Co., Limited, 64 Victoria street, Westminster, London, S. W. 1.

409,823 FEDERUBER—manufactured rubber and gutta percha goods not included in classes other than No. 40. George Spencer Moulton & Co., Limited, and Wood-Milne, Limited, 2 Central Buildings, Westminster, London, S. W. 1.

PUBLISHED FEBRUARY 23, 1921

405,456 RALCO—balata machine belting. William Thomas Lambourne, trading as The W. T. Lambourne Co., 5 Henrietta street, Covent Garden, London, W. C. 2.

B409,626 FEATHEREDGE and the words TRADE MARK—rubber sponges. Featheredge Rubber Co., 408 West Grand avenue, Chicago, Ill., U. S. A.; address for service in the United Kingdom, care of H. Gardner & Son, 173-175 Fleet street, London, E. C. 4.

NEW ZEALAND

PUBLISHED FEBRUARY 10, 1921

16,515 Representation of seal of company, bearing, among other things, the name of the company and the words PICHER PURE WHITE LEAD—lead pigments, carbonate, sulphate, monoxide, oxidized white lead, etc., for use in the rubber and other industries. The Eagle-Picher Lead Co., 1020 Broadway, Cincinnati, Ohio. U. S. A.

16,579 OLDFIELD formed by representation of a tire as O and the letters LDFIELD, so drawn as to look as if they were traveling along a road—pneumatic and solid tires, inner tubes, and accessories. The Oldfield Tire Co., 2045 Euclid avenue, Cleveland, Ohio, U. S. A.

DESIGNS

THE UNITED STATES

NO. 57,184 Tire. Patented March 1, 1921. Term 14 years. W. D. Carnal, Akron, assignor to The Tuscora Rubber Co., New Philadelphia—both in Ohio.

57,185 Tire. Patented March 1, 1921. Term 14 years. James Christy, Cleveland, assignor to The Portage Rubber Co., Barberton—both in Ohio.

57,207 Tire. Patented March 8, 1921. Term 14 years. W. Carnal, Akron, assignor to The Knox Tire & Rubber Co., Mount Vernon—both in Ohio.

57,208 Tire. Patented March 8, 1921. Term 14 years. W. Carnal, Akron, assigner to The Knox Tire & Rubber Co., Mount Vernon—both in Ohio.

57,209 Tire. Patented March 8, 1921. Term 14 years. W. Carnal, Akron, assigner to The Knox Tire & Rubber Co., Mount Vernon—both in Ohio.

57,210 Tire. Patented March 8, 1921. Term 14 years. W. D. Carnal, Akron, assigner to The Tuscora Rubber Co., New Philadelphia—both in Ohio.

57,211 Tire. Patented March 8, 1921. Term 14 years. W. D. Carnal, Akron, assigner to The Tuscora Rubber Co., New Philadelphia—both in Ohio.

57,224 Tire casing. Paented March 8, 1921. Term 7 years. T. G. Graham, assignor to Sears, Roebuck & Co.—both in Chicago, Ill.

57,225 Rubber Heel. Patented March 8, 1921. Term 14 years. G. W. Grubb, New Philadelphia, Ohio.

57,257 Tire casing. Paented March 8, 1921. Term 14 years. Ludvig T. Petersen, assignor to The Republic Rubber Corporation—both of Youngstown, Ohio.

57,258 Tire casing. Patented March 8, 1921. Term 14 years. Ludvig T. Petersen, assignor to The Republic Rubber Corporation—both of Youngstown, Ohio.

57,259 Tire casing. Patented March 8, 1921. Term 14 years. Ludvig T. Petersen, assignor to The Republic Rubber Corporation—both of Youngstown, Ohio.

57,260 Tire casing. Patented March 8, 1921. Term 14 years. Ludvig T. Petersen, assignor to The Republic Rubber Corporation—both of Youngstown, Ohio.

57,261 Tire casing. Patented March 8, 1921. Term 14 years. Ludvig T. Petersen, assignor to The Republic Rubber Corporation—both of Youngstown, Ohio.

57,265 Non-skid tire. Patented March 8, 1921. Term 3½ years. W. H. R. Thaler, assignor to New Castle Rubber Co.—both of New Castle, Pa.

57,271 Air hose stand. Patented March 8, 1921. Term 14 years. G. F. Royer, Wilkes Barre, Pa.

57,290 Tire. Patented March 8, 1921. Term 14 years. M. L. Wiener, Akron, assignor to The Oldfield Tire Co., Cleveland—both in Ohio.

57,295 Tire. Patented March 15, 1921. Term 14 years. Addison A. Arter, Omaha, Nebr.

57,297 Tire tread. Patented March 15, 1921. Term 3½ years. Herbert T. Auerbach, Buffalo, New York.

57,303 Tire. Patented March 15, 1921. Term 14 years. D. L. Becker, Oakland, Calif.

57,307 Tire. Patented March 15, 1921. Term 14 years. J. J. Black, assignor to The Master Tire & Rubber Co.—both of Dayton, O.

57,310 Advertising clock having tire as frame, and bearing the words TIME TO RETIRE beneath bust of figure yawning with arms upraised. Patented March 15, 1921. Term 14 years. F. R. Bussert, Chicago, Ill.

57,332 Tire tread. Patented March 15, 1921. Term 14 years. L. A. Gredys, Akron, Ohio.

57,336 Tire casing. Patented March 15, 1921. Term 14 years. A. H. Harris, Barberton, assignor to The Cleveland Rubber Corporation Co., Cleveland—both in Ohio.

57,339 Rubber heel. Patented March 15, 1921. Term 14 years. E. J. Hooper, Stoughton, Mass., assignor to Foster Rubber Co. Kennebunk, Me.

57,340 Tire casing. Patented March 15, 1921. Term 14 years. F. C. Hudson, assignor to Archer Tire & Rubber Co.—both of Minneapolis, Minn.

57,348 Advertising sign with reproduction of automobile wheel and tire at one end. Patented March 15, 1921. Term 7 years. R. R. Johnstone, Wauwatosa, Wis.

57,350 Tire tread. Patented March 15, 1921. Term 7 years. L. M. Kennedy, Fulton, Ill.

57,363 Cushion tire. Patented March 15, 1921. Term 14 years. H. M. Lambert, Portland, Oreg.

57,376 Tire. Patented March 15, 1921. Term 7 years. J. H. Patten, Seattle, Wash.

57,377 Tire Tread. Patented March 15, 1921. Term 14 years. W. H. Paull, Birmingham, assignor to The Dunlop Rubber Co., Limited, London—both in England.

57,386 Tire. Patented March 15, 1921. Term 7 years. N. Serlin, Chicago, Ill.

57,408 Tire casing. Patented March 15, 1921. Term 14 years. O. L. Weaver, assigner to The Star Rubber Co.—both of Akron, Ohio.

THE DOMINION OF CANADA

4,998 Rubber heel for soft shoe soles. Patented March 1, 1921. The Hurlbut Co., Limited, Preston, Ont.

GERMANY

DESIGN PATENTS ISSUED, WITH DATES OF ISSUE

767,240 (June 6, 1920). Tobacco pouch of seamless rubber. Paragummiwerk m. b. H., Köln-Dentz.

767,612 (January 26, 1921). Waterproof rain hat. Continental-Caoutchouc und Gutta-Percha Compagnie, Hannover.

767,755 (October 18, 1920). Rubber band for rubber coating on footwear. Karl Bayer, Herrenkellergasse 1, Ulm a. D.

767,813 (January 29, 1921). Atomizer. Alfred Wassmuth, G. m. b. H., Köln-Delbrück.

767,816 (January 31, 1921). Slip-on rubber heel. Gustav Hoelze, Luisenallee 92, Konigsberg i. Pr.

767,922 (January 29, 1921). Dry inhaling apparatus. Wilhelm Bregler, Pragstrasse 94, Stuttgart-Cannstatt.

767,924 (January 29, 1921). Atomizer. Max Heinz Gurth, Belle Alliance Strasse 47, Berlin.

768,003 (January 31, 1921). Rubber tread for bicycles, motorcycles and automobiles. Vereinigte Gothiana-Werke A.-G., Gotha.

768,318 (February 4, 1921). Mouth-piece. New York Hamburger Gummi-Waaren Compagnie, Hamburg.

768,421 (February 2, 1921). Athletic belt, August Gross, Kurfüstendamm 47, Berlin.

768,535 (February 5, 1921). Stuffing-box packing. Joh. Behrens, Bornstrasse 57, Bremen.

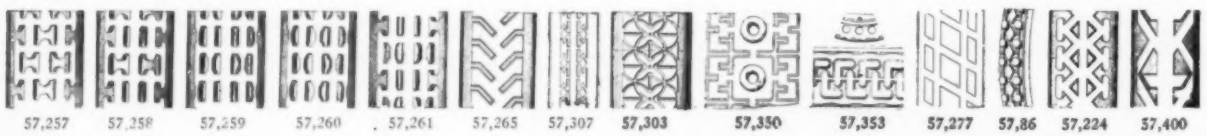
768,942 (January 12, 1921). Rubber heel, with non-slipping device. Ella Meyar, Marienstr. 9., Harburg a. E.

769,030 (February 7, 1921). Kidney-shaped rubber sucker for dental gumplates. Paul Weyel & Täschner, Düren, Rhld.

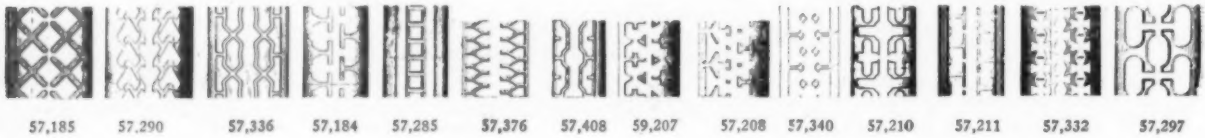
769,077 (January 26, 1921). Hygienic protector for ladies. Oskar Petrich, Bulmannstr. 23, Nürnberg.

769,259 (November 9, 1920). Aluminum plate with circular hollow for renewable rubber heels. Bernhard Ridder, Römerstr. 97, Koblenz.

769,266 (December 7, 1920). Renewable sole protector of elastic rubber. Anton Kolodziej, Füsilierstr. 6, Hannover.



57,257 57,258 57,259 57,260 57,261 57,265 57,307 57,303 57,350 57,353 57,277 57,86 57,224 57,400



57,185 57,290 57,336 57,184 57,285 57,376 57,408 59,207 57,208 57,340 57,210 57,211 57,332 57,297

Review of the Crude Rubber Market

NEW YORK

IN THE NEW YORK MARKET there has been some activity due to purchases mostly by small western manufacturers and some trading among dealers for various future positions in all grades. Prices responded with an upward tendency on the news of elimination of the threat of a general strike in England and favorable domestic rail decision. Settlement of the refinancing of the Goodyear company, and news that this company is on a production basis of 18,000 tires per day had a marked influence to firm rubber prices.

Prompt and May-June shipments were offered at 17½ cents on ribs while first latex crêpe still remains at a premium of 1½ to 2 cents on all positions. Parás have also firmed up about ½ cent on the general better feeling. Ambers, browns and roll are offered in fair quantities, spot rolled brown advancing from 10½ to 11¾–12 cents. Firmer prices may be expected with increased factory demand.

It is reported from a Dutch source that in the Netherlands East Indies there are almost no estates still able to produce with a profit at present prices. An improvement in the rubber price is not to be anticipated as the estimated world's stock of 300,000 tons at the end of February, 1921, being the world's output of about one year, will counteract the effect of restricted output in a marked degree.

Imports during March were 14,416 tons of all grades, compared with 31,650 tons last year. Plantation arrivals for March were 12,241 tons, compared with 28,533 tons a year ago. Total imports for the first three months of 1921 were 37,234 tons, compared with 85,995 tons for the same period in 1920.

Spot and future quotations on standard plantation and Brazilian grades were as follows:

PLANTATIONS. April 2. Spot first latex crêpe 18½ cents; April–June, 18½ cents; July–September, 21 cents; July–December, 22 cents.

April 25. Spot first latex crêpe, 19½ cents; May-June, 19½ to 20 cents; July–September, 20½ to 21 cents; July–December, 22 to 22½ cents.

April 2. Spot ribbed smoked sheets, 16¼ to 16½ cents; April-June, 17 cents; July–September, 18½ cents; July–December, 20 to 20½ cents.

April 25. Spot ribbed smoked sheets, 17 to 17½ cents, May–June, 17½ to 18 cents; July-September, 18½ to 19½ cents; July–December, 20 to 20½ cents.

April 2. No. 1 amber crêpe, 15½ cents.

April 25. No. 1 amber crêpe, 15½ to 16 cents.

April 2. No. 1 rolled brown crêpe, 11 cents.

April 25. No. 1 rolled brown crêpe, 12 to 12½ cents.

SOUTH AMERICAN PARÁS AND CAUCHO. April 2. Upriver fine, 17 cents; islands fine, 17 cents; upriver coarse, 10 cents; islands coarse, 12 cents; Cametá, 10 cents; caucho ball, 13½ cents.

April 25. Upriver fine, 17½ to 18 cents; islands fine 17¾ to 18 cents; upriver coarse, 9 to 9½ cents; islands coarse, 12 to 12½ cents; Cametá, 12 to 12½ cents; caucho ball, 11 to 12½ cents.

NEW YORK QUOTATIONS

Following are the New York spot quotations, for one year ago, one month ago, and April 25, the current date:

PLANTATION HEVEA	May 1 1920	April 1 1921	April 25 1921
First latex crêpe	$0.42½@.43	$0.18½@.19	$0.19 @.19½
Off latex crêpe	@	.17 @.18	.18 @.18½
Amber crêpe No. 1	.44 @.45	.15½@.16	.15½@
Amber crêpe No. 2	.43 @	.14½@.15	.14½@
Amber crêpe No. 3	.42 @	.13½@.14	.13½@

	May 1 1920	April 1 1921	April 25 1921
PLANTATION HEVEA			
Amber crêpe No. 4	$0.41 @	$0.12½@.13	$0.12½@
Brown crêpe, thick and thin	.42 @	.13½@.14	.15½@
Brown crêpe, specky	.39 @	.11 @.12	.13½@
Brown crêpe, rolled	.34 @	.12 @	.12 @.12½
Smoked sheet, ribbed	.42½@.43	.16½@	.17 @.17½
Smoked sheet, plain	.40 @	.15 @.16	.15½@
Unsmoked sheet	@	.15 @	.15½@
Colombo scrap No. 1	.35 @	.11 @	.11½@
Colombo scrap No. 2	.42 @	.09 @	.09½@
EAST INDIAN			
Assam crêpe	@	@	@
Assam onions	@	@	@
Penang block scrap	@	@	@
PONTIANAK			
Banjermassin	.13 @	.07 @	.07 @
Palembang	@	.09 @	.09 @
Pressed block	.25 @	.11¾@	.12 @
Sarawak	@	.06 @	.06 @
SOUTH AMERICAN			
PARAS			
Upriver, fine	.42 @	.17 @.17½	.17½@.18
Upriver, medium	.39 @	.14 @	.13½@
Upriver, coarse	.31 @	.10 @	.09½@
Upriver, weak, fine	.36 @	.11 @.12	@
Islands, fine	*.41½@	.17 @	.18 @
Islands, medium	*.38 @	.13 @	.13½@
Islands, coarse	.22 @	.12 @	.12½@
Cametá	.22 @	.10½@	.12½@
Acre Bolivian, fine	.42½@	.18 @	.18 @
Madeira, fine	.44 @	.19½@.20	.19½@
Feruvian, fine	.40 @	.16 @	.16½@
Tapajos, fine	.40 @	.16 @.16½	.15½@
CAUCHO			
Upper caucho ball	.32½@	.14 @	.12½@
Lower caucho ball	.29 @	.10½@	.11 @
MANICOBAS			
Ceará negro heads	*.33 @	.10 @	.10 @
Ceará scrap	*.30 @	.05 @	.06 @
Manicoba, 30% guarantee	*.30 @.33	.09½@.10	.11 @
Mangabeira thin sheet	.31 @	.12 @	.12 @
CENTRALS			
Corinto scrap	.29 @.30	.11 @.12	.09 @.10
Central scrap	@	.11 @.12	.09 @.10
Central scrap and strip	.27 @.28	.08 @.10	.07 @.08
Central wet sheet	.19 @	.05 @.07	.04 @.05
Esmeralda sausage	.29 @.30	.11 @ 12	.09 @.10
Guayule, 20% guarantee	.28 @	@	@
Guayule, washed and dried	.38 @	*.26 @	.26 @
AFRICANS			
Benguela, extra No. 1, 28%	.25 @	@	@
Benguela, No. 2, 32½%	.21 @	@	@
Conakry niggers	.34 @	@	@
Congo prime, black upper	.37 @	@	@
Congo, prime, red upper	.33 @	@	@
Kassai, black	@	@	@
red	.35 @	@	@
Massai sheets and strings	.34 @	@	@
Niger flake, prime	.18 @	@ .14	@
Rio Nunez ball	.36 @	@	@
Rio Nunez sheets, strings	.34 @	@	@
GUTTA PERCHA			
Gutta Siak	.30 @.31	.15½@	.15 @.16
Red Macassar	2.70 @	2.25 @	2.00 @2.75
BALATA			
Block, Ciudad, Bolivar	.67 @.68	.56 @	.54 @.55
Colombia	.53 @.54	.47 @.48	.45 @.46
Fanama	.48 @.50	.46 @.47	.45 @.46
Surinam sheet	.84 @	.68 @.69	.70 @.71
amber	.86 @	.80 @.82	.80 @

NEW YORK AVERAGE SPOT RUBBER PRICES

APRIL, 1921

	4	5	6	7	8	9	11	12	13	14	15	16
Plantations—												
Sheet:												
Ribbed Smoked	16	16¼	16¼	16¾	16¼	16¾	16½	16½	16½	16¾	17	17¼
Crêpe:												
First latex	18¼	18½	18¾	18¼	18¾	18½	18¾	18½	18½	19	19¼	19¼
Off latex	15⅜	16¼	15¾	16¼	16	16	16½	16	16	16¾	16¾	17½
No. 1 blanket	14¾	14¾	14¾	14¾	14½	14¾	14⅞	14¾	14¾	14¾	14¾	15
No. 2 blanket	13¾	13¾	13¾	13¾	13½	13¾	13⅞	13¾	13¾	13¾	13¾	14
No. 3 blanket	12¾	12¾	12¾	12¾	12½	12¾	12⅞	12¾	12¾	12¾	12⅞	13
Thin clean brown	13¾	14	13½	13½	13¾	13¾	14¾	14½	14¾	14	14¾	14½
Specky brown	11¾	12	11¾	10	10¾	11½	11⅞	12	12	11½	12¼	11¾
Rolled brown	11¼	11½	10¾	10¾	10¾	10¾	11⅛	10⅞	10¾	11	11¾	11½

*Nominal.

COMPARATIVE LOW AND HIGH NEW YORK SPOT RUBBER PRICES

	April 1921*	1920	1919
PLANTATIONS			
First latex crêpe	$0.18¼ @ $0.19½	$0.42½ @ $0.46½	$0.47 @ $0.50½
Smoked sheet ribbed	.16 @ .17¼	.42½ @ .45	.46½ @ .49½
PARAS			
Upriver, fine	.16½ @ .18	.40½ @ .42	.56 @
Upriver, coarse	.09 @ .10½	.30 @ .32	.34 @
Islands, fine	.17 @ .18	.41 @ .42	.47½ @
Islands, coarse	.09½ @ .12	.21½ @	.21½ @
Cametá	.08 @ .11	.22½ @	.22½ @

*Figured to April 25, 1921.

ANTWERP RUBBER MARKET

GRISAR & CO., Antwerp, report under date of April 7, 1921:

Inactivity continues to be the predominating note in the rubber market. After having touched the low rate of 10½*d*, prices recovered slightly and the market closed with the following quotations, in favor of buyers: First latex crêpe, spot, 10¾*d*; April-June, 11*d*; July-September, 1*s*, 0¼*d*; July-December, 1*s*, 0¾*d*; October-December 1*s*, 1¼*d*. Fine Para, 11*d*.

Statistics for the week were as follows: Arrivals, 2,112 tons; sales, 889 tons; stock: 64,782 tons against 21,614 tons in 1920.

In Antwerp the stocks on hand were about 1,829 tons. The futures market remains quiet, without any change in rdtes. Quotations were: April, 5.80; May, 5.85; June, 5.95; July, 6.10; August-October, 6.20; November, 6.30; December-March, 6.40.

HAMBURG RUBBER MARKET

EFFEKTIV-ROHGUMMIMAKLER-VEREIN, Hamburg, report, March 26, 1921:

As a result of unchanged, steady reports from London a comparatively regular business developed here. This was made possible only by the yielding tendency of sellers.

Sales took place in fine Pará, first latex crêpe, thick and thin crêpe, smoked sheets, and medium grades. Prices ranged from:

	Marks
First latex crêpe	27.50 @ 29.50
Ribbed smoked sheets	23 @ 25
Ribbed smoked sheets, lower grade	19 @ 22.50
Brown crêpe, clean	19 @ 23
Brown crêpe, somewhat barky	16 @ 20
Dark crêpe	15.50 @ 18
Hard fine Pará	27 @ 29
Caucho ball	20 @ 23
Congos	17 @ 21
Block balata	60 @ 85
No. 1 balata sheet	100 @ 110
Jelutong	13 @ 17

AMSTERDAM RUBBER MARKET

JOOSTEN & JANSSEN, Amsterdam, report, under date of April 1, 1921:

Expect some turnover in sheets September delivery at 60 cents, and a few small spot parcels, nothing was done since the Easter holidays. The tone was dull and prices finally gave way somewhat, demand being very poor, closing about as follows:

Hevea Crêpe, Fl. 60. Sheets, Fl. 52 on the spot.
Hevea Crêpe, Fl. 62. Sheets, Fl. 53 April-June.
Hevea Crêpe, Fl. 66. Sheets, Fl. 58 July-September.
Hevea Crêpe, Fl. 69. Sheets, Fl. 63 October-December.

RECLAIMED RUBBER

The reclaimed rubber situation is sharing in the gradual improvement of the rubber manufacturing industry generally. The large reclaimers are resuming operation at about one-third capacity. It is rumored that one of the largest users of automobile topping has adopted artificial leather in place of rubber-coated topping. This raises the question of how to utilize the large tonnage of shoe reclaim thus released and what reaction this will have on prices for reclaim and scrap.

NEW YORK QUOTATIONS

APRIL 25, 1921

Prices subject to change without notice

STANDARD RECLAIMS		
Floating	*$0.15	@ $0.18
Friction	* .15	@ .18
Mechanical	* .09	@ .11
Shoe	* .12½	@ .13½
Tires, auto	* .12	@ .13½
truck	* .09	@ .11
White	* .15	@ .18

*Nominal.

SINGAPORE RUBBER MARKET

GUTHRIE & CO., Limited, Singapore, report under date of March 10, 1921:

Since last reporting, the rubber market has shown a steadier tendency and a fair volume of business has been transacted between dealers. Chinese buyers have been practically out of the market, and orders from Japan have ceased for the time being.

For the auction held yesterday and today, the quantity cataloged for sale was 929 tons. Demand was fairly good, but bidding was slow and values somewhat erratic, due to buyers tentatively feeling their way.

Standard ribbed smoked sheet sold freely at 30½ to 31½ cents. Standard pale crêpe was in strong demand and sold up to 39 cents, an advance of 2 cents on the week. There is a shortage of this grade at present, and a heavy premium is obtainable. Off quality crêpe was a good market, but off sheet declined slightly, and moldy lots were sorely penalized. Lower grade crêpes were somewhat firmer. The quantity sold was 555 tons. The following is the course of values:

	In Singapore per pound[1]	Sterling Equivalent per pound in London
Sheet, fine ribbed smoked	30½ @ 31½	—/10⅞ @ —/11⅛
Sheet, good ribbed smoked	20 @ 30	—/ 7⅛ @ —/10¾
Crêpe, fine pale	39 @ ..	1/ 1¾ @ —/..
Crêpe, good pale	21½ @ 38	—/ 8⅛ @ 1/ 1½
Crêpe, fine brown	19 @ 26	—/ 8⅛ @ —/10⅛
Crêpe, good brown	12½ @ 18½	—/ 6¼ @ —/ 8
Crêpe, dark	12 @ 16	—/ 6⅛ @ —/ 7¼
Crêpe, bark	10 @ 12½	—/ 5¼ @ —/ 6¼

[1] Quoted in Straits Settlements currency, $1 equals $0.567 United States currency.

NEW YORK AVERAGE SPOT RUBBER PRICES

JANUARY, 1921

	3	4	5	6	7	8	10	11	12	13	14	15	17	18	19	20	21	22	24	25	26	27	28	29	31
Ribbed smoked sheets	16¼	16¼	18½	18	17¾	17⅞	18¼	20¼	20	20¾	20¾	20¾	20¾	20⅞	20¾	20¼	19¾	19¾	19¾	19½	19¼	18¾	18¼	18¼	17⅞
First latex crêpe	16¾	17½	19	18½	18½	18½	19¼	21	20¾	21¾	21½	21½	21⅜	21½	21¾	21½	20¼	20½	19⅞	19¾	19¾	19¼	19¼	19¼	19¼
Off latex crêpe	15	15¼	17½	16½	16½	16¾	17¾	19⅜	18¾	19¾	19	19	19⅛	18½	19¼	18⅜	18½	18¼	17⅞	18	18	17½	17¼	17¼	17½
Clean thin brown crêpe	13¾	14	16	16	14¾	14¾	15⅞	16½	15⅞	17½	16⅛	16⅛	16⅜	16½	17⅛	16½	15⅜	15¾	15⅜	15⅝	15½	16¼	15¼	15¼	14¾
Specky brown crêpe	9¼	10½	12½	12	11¾	11½	12¾	14	13½	15¼	13⅞	13⅝	14	13¼	14½	13⅝	13⅜	13½	13¼	12⅞	13¼	13⅞	13⅜	13½	13¼
No. 1 blanket crêpe	13½	14½	14¾	16	15½	15¼	16⅞	17	17½	17¼	17½	17¾	17⅝	17⅜	17⅜	17½	16¾	16¾	16½	16¼	16⅜	16	16	16	15¾
No. 2 blanket crêpe	12¾	13½	14	15	14½	14¼	15⅞	16	16½	16¼	16⅛	16⅜	16⅝	16¼	16⅜	16½	15¾	15¾	15½	15¼	15¼	15	15	15	14¾
No. 3 blanket crêpe	11¾	12½	13	14	13½	13¼	15	15½	15¼	15½	15½	15⅝	15⅝	15⅜	15⅜	15⅝	14¾	14¾	14½	14½	14¾	14	14	14	13¾
Rolled brown crêpe	10	10½	10½	12	11½	11	12¼	11½	13	13	13½	13¼	12⅞	12½	13¼	13¼	12½	12½	12⅝	12¼	12½	12¼	12	11¾	11½

FEBRUARY, 1921

	1	2	3	4	5	7	8	9	10	11	14	15	16	17	18	19	21	23	24	25	26	28
Ribbed smoked sheets	17¼	17¼	17¼	17⅛	17¼	17¾	18⅛	18½	18¾	18½	18½	18½	18½	18⅛	18¼	18¼	18¼	18¼	18⅛	17⅝	17¾	16¾
First latex crêpe	18⅞	18¾	18⅛	18⅞	19¼	19¼	19⅝	18⅞	20⅛	19½	19½	19¾	20	19¾	19½	19¾	19¾	19¾	19¾	19½	19¾	18½
Off latex crêpe	17¼	17⅛	16¾	17⅞	17¾	17½	17⅜	17½	17¾	17¾	17¾	17¾	17¾	17⅝	17½	16½	16½	16½	17⅜	17	17½	17	16½
Clean thin brown crêpe	14⅜	14½	14¾	14⅜	14½	14½	14¾	15	14¾	14⅝	14½	14½	14½	15	14⅝	14½	14½	14½	14½	14½	14½	14
Specky brown crêpe	12⅝	12⅞	12¾	12	12½	12½	12½	12¾	12¼	12⅛	12¼	12¼	12¼	12¾	12½	12½	12½	12½	12½	11⅜	12½	12½	11¾
No. 1 blanket crêpe	15	15¼	14½	15¼	15¼	15¼	15¾	16	16½	15⅞	15⅝	16	16⅛	16	16	16	16	16	16½	16¼	15⅞	16	15¾
No. 2 blanket crêpe	14	14½	13¾	14½	14½	14¼	14¾	15	15¼	14⅞	14⅝	15	14⅞	14¾	15	15¼	15	15	15	15½	15½	14⅞	15	14¾
No. 3 blanket crêpe	13	13½	12½	13½	13¼	13¼	13¾	14	14½	13⅞	13¾	14	14⅛	14	14	14	14	14	14½	14¼	13⅞	14	13¾	13½
Rolled brown crêpe	11½	12	11½	11½	11½	11½	12¼	11½	11¾	11½	12	12	11½	11½	12½	12½	12½	12¼	12	11¾	11¾	11½

MARCH, 1921

	1	2	3	4	5	7	8	9	10	11	12	14	15	16	17	18	19	21	22	23	24	25	26*	28	29	30	31
Ribbed smoked sheets	16½	16¾	16⅞	17⅛	17⅜	17⅝	17½	17¼	16¾	16¾	16⅞	16¾	17½	16⅞	16⅞	17½	17½	17⅝	17½	17⅛	16¾	16¾	....	16⅞	17	16⅝	16⅝
First latex crêpe	18¼	18¼	18½	19½	19⅜	19½	18¾	18⅜	18¾	19		18⅜	18⅜	18⅜	18⅜	18⅜	19¼	18¾	18⅜	18⅜	18⅜	....	18¾	18⅜	18¾	18¾
Off latex crêpe	15⅞	16⅛	17¼	17⅜	17½	17½	17	17½	17¼	17¼	17¼	17	17½	17¼	16¾	17½	17½	16⅞	17	16¾	17¼	17¼	....	16¾	16¾	16¾	16¾
Clean thin brown crêpe	14	14½	14½	14⅞	14¾	14½	14⅜	14	14	14	14¼	14¼	14⅞	14¾	14¾	14¼	14¼	14½	14	14	13½	13½	....	13½	13¾	13½	13¾
Specky brown crêpe	11⅜	11¾	12	12	12½	12¼	12⅛	11½	11⅝	11¾	12⅛	12¼	11½	12¼	12½	12½	12¼	12	12	12	11½	11½	....	11¾	11¾	10¾	11
No. 1 blanket crêpe	15¼	15¼	15½	16	16¼	15⅝	15¾	16	15½	15¾	15½	15½	15¾	15½	15⅝	15⅝	15⅜	15¾	15⅜	15¾	15¾	15¾	....	15¼	15½	15¼	15¼
No. 2 blanket crêpe	14¾	14¾	14½	15	15¼	14⅞	14¾	14¾	15	14½	14¾	14½	14½	14¾	14¾	14¾	14¾	14¾	14¾	14¾	14¾	14¾	....	14¼	14½	14¼	14¼
No. 3 blanket crêpe	13¾	13¾	13½	14	14¼	13⅞	13¾	14	13½	13¾	13½	13¾	13½	13⅝	13⅝	13¾	13¾	13¾	13¾	13¾	13¾	13¾	....	13¼	13½	13¼	13¼
Rolled brown crêpe	11¾	11½	12	12¼	11⅞	12¼	12	11½	11½	11⅜	11⅞	12	11½	12	11⅝	11⅜	12½	12⅜	12	11⅜	11¾	....	12¼	11½	11½	11¼

*Trade closed.

STRAITS SETTLEMENTS RUBBER EXPORTS

It is announced by official report from Singapore that 5,813 tons of rubber were exported from Straits Settlements ports in the month of February, as compared with 5,809 tons in January and 17,379 tons in the corresponding month last year. Transhipments amounted to 1,958 tons. Totals to end of February: 1921, 11,622 tons; 1920, 30,504 tons; 1919, 30,065 tons. Appended are the comparative statistics:

	1919	1920	1921
January ..... *tons*	14,404	13,125	5,809
February	15,661	17,379	5,813
Totals..... *tons*	30,065	30,504	11,622

These figures include transhipments of rubber from various places in the neighborhood of the Straits Settlements, such as Borneo, Java, Sumatra and the non-Federated Malay States as well as rubber actually exported from the Colony, but do not include rubber exports from the Federated Malay States.

FEDERATED MALAY STATES RUBBER EXPORTS

An official report from Kuala Lumpur states that the export of plantation rubber from the Federated Malay States in the month of February amounted to 6,091 tons as against 7,085 tons in January and 9,781 tons in the corresponding month last year. The total export to the end of February was 13,176 tons, against 20,900 tons in 1920 and 17,972 tons in 1919. Appended are the comparative statistics:

	1919	1920	1921
January ..... *tons*	7,163	11,119	7,085
February	10,809	9,781	6,091
Totals..... *tons*	17,972	20,900	13,176

CEYLON RUBBER IMPORTS AND EXPORTS

IMPORTS

	January 1 to January 31	
	1920	1921
Crude rubber:		
From Straits Settlements..... *pounds*	385,100	198,989
India	131,590	98,214
Burma and other countries.....	6,300	.....
Totals	522,990	297,203

EXPORTS

Crude rubber:		
To United Kingdom ..... *pounds*	3,811,739	3,811,487
Belgium	18,360	78,492
France	11,200	163,520
Germany	.....	446,051
Holland	.....	110,223
Denmark	.....	11,200
Italy	.....	67,200
Victoria	.....	49,730
New South Wales.....	20,191	15,760
United States	1,492,886	3,475,888
Canada and Newfoundland.....	257,600	254,025
India	.....	3,040
Japan	52	20,160
Totals	5,612,028	8,506,776

PLANTATION RUBBER EXPORTS FROM MALAYA

(These figures include the production of the Federated Malay States, but not of Ceylon.)

	January 1 to December 31, 1920			January 1 to March 3, 1921	
	Singapore	Malacca	Penang	Port Swettenham	Totals
To United Kingdom....*pounds*	65,767,971	3,569,973	24,735,492	3,381,772	97,455,208
The Continent..	15,193,455	880,666	506,266	11,200	16,591,587
Japan	13,475,062	.....	2,277	.....	13,477,339
Ceylon	10,299	.....	487,733	106,968	605,000
United States and Canada...	278,609,400	57,814	19,281,456	.....	297,948,670
Australia	1,235,410	.....	.....	.....	1,235,410
China (Hong-Kong)	.....	.....	.....	.....	.....
Other countries.	427,390	.....	9,333	.....	436,723
Totals.....	374,718,987	4,508,453	45,022,557	3,499,940	427,749,937
For the year 1920.	374,718,987	4,508,453	45,022,557	26,306,225	450,556,222
For the year 1919.	352,338,000	17,849,500	25,779,500	30,850,166	426,817,166
For the year 1918.	225,100,000	837,600	12,479,200	.....	238,416,800
For the year 1917.	177,901,200	15,113,200	23,402,000	.....	216,416,400
For the year 1916.	135,535,954	7,167,346	30,643,565	360,840	177,007,705
For the year 1915.	86,067,657	7,898,984	28,580,663	821,445	123,368,749
For the year 1914.	43,534,177	5,218,379	21,912,567	2,052,620	72,717,743

Compiled by Barlow & Co., Singapore.

RUBBER EXPORTS FROM PENANG

	January 1 to January 31	
	1920	1921
To Great Britain..... *piculs*[1]	25,363	14,151
Europe	490	173
United States	22,030	235
Totals..... *piculs*[1]	47,883	14,559

[1]One picul equals 133⅓ pounds.

PLANTATION RUBBER EXPORTS FROM JAVA*

	December		Twelve Months Ended December 31	
	1919	1920	1919	1920
To Netherlands .....*kilos*	325,000	418,000	2,971,000	5,011,000
Great Britain	190,000	739,000	7,223,000	8,802,000
Germany	.....	37,000	.....	146,000
France	.....	10,000	215,000	53,000
Belgium	.....	44,000	.....	161,000
Italy	.....	.....	.....	42,000
Other European destinations	25,000	.....	25,000	.....
United States.....	2,225,000	522,000	18,766,000	12,058,000
Singapore	357,000	258,000	5,365,000	4,447,000
Japan	.....	.....	183,000	194,000
Australia	.....	18,000	245,000	252,000
Other countries	.....	.....	169,000	.....
Totals .....*kilos*	3,122,000	2,046,000	35,162,000	31,166,000
Ports of origin:				
Tandjong Priok ....*kilos*	2,145,000	853,000	18,412,000	14,583,000
Samarang	58,000	31,000	562,000	506,000
Soerabaya	914,000	1,099,000	15,075,000	14,926,000

*The returns for the month of November are verified.

CRUDE RUBBER ARRIVALS AT ATLANTIC AND PACIFIC PORTS AS STATED BY SHIPS' MANIFESTS

PARAS AND CAUCHO AT NEW YORK

	Fine	Medium	Coarse	Caucho	Totals Pounds
MARCH 29. By the S. S. "Strabo," from Manáos.					
Poel & Kelly.....	.....	.....	.....	.....	158,448
MARCH 29. By the S. S. "Strabo," from Pará.					
Poel & Kelly.....	.....	.....	.....	.....	20,127
Meyer & Brown, Inc.....	54,880*	.....	.....	.....	54,880
Paul Bertuch	22,336	.....	.....	.....	22,236
H. A. Astlett & Co.....	95,000	8,000	2,500	60,000	165,500
MARCH 30. By the S. S. "Polycarp," from Manáos.					
General Rubber Co.....	.....	.....	.....	.....	32,000
G. Amsinck & Co., Inc.....	.....	.....	.....	.....	28,000
Meyer & Brown, Inc.....	63,840*	.....	.....	.....	63,840
Various	.....	.....	.....	.....	180,234
MARCH 30. By the S. S. "Polycarp," from Iquitos.					
Various	.....	.....	.....	.....	4,707
MARCH 30. By the S. S. "Polycarp," from Pará.					
Poel & Kelly.....	.....	.....	.....	.....	10,484
Various	.....	.....	.....	.....	102,731
APRIL 19. By the S. S. "Bronte," from Santos.					
Arkell & Douglas, Inc.....	.....	.....	.....	.....	†429
Poel & Kelly.....	.....	.....	.....	.....	†5
Paul Bertuch	.....	34,573	1,105	.....	35,678
A. M. Capen's Sons, Inc.....	.....	.....	.....	.....	†132
Various	.....	.....	.....	.....	†408
APRIL 16. By the S. S. "Sallust," from Pará.					
Meyer & Brown, Inc.....	59,360	.....	.....	.....	59,360
Various	.....	.....	.....	.....	‡92

*Includes medium. †Cases. ‡Packages.

PLANTATIONS

(*Figured* 180 *pounds to the bale or case*)

	Shipment from:	Shipped to:	Pounds	Totals
MARCH 18. By the S. S. "Lacmedon," at New York.				
Goldman, Sachs & Co....	Singapore	New York	137,880	
Rubber Trading Co.....	Singapore	New York	54,000	
Baring Bros.	Singapore	New York	34,560	
Hood Rubber Co.....	Singapore	Watertown	126,000	
Kidder, Peabody & Co...	Singapore	New York	53,640	
East Asiatic Co., Inc....	Singapore	New York	111,060	
Paterson, Simmons & Co.	Singapore	New York	48,600	
Chas. T. Wilson Co., Inc.	Singapore	New York	103,184	
Irwin-Harrison & Crosfield, Inc.	Singapore	New York	55,800	
J. Aron & Co.....	Singapore	New York	21,600	
Aldens' Successors, Inc..	Singapore	New York	105,120	
Thornett & Fehr.....	Singapore	New York	125,280	
Edward Boustead & Co..	Singapore	New York	10,800	
Poel & Kelly.....	Singapore	New York	11,520	
Firestone Tire & Rubber Co.	Singapore	Akron	105,480	
Goschen & Cunliffe.....	Singapore	New York	28,800	
Eastern Rubber Co.....	Singapore	New York	42,660	
H. A. Astlett Co.....	Singapore	New York	170,000	
Hood Rubber Co.....	Singapore	Watertown	190,302	
Various	Singapore	New York	2,020,894	
H. A. Astlett Co.....	Colombo	New York	140,000	
Hood Rubber Co.....	Colombo	Watertown	220,640	
Various	Colombo	New York	468,180	
Hood Rubber Co.....	London	Watertown	33,600	4,419,600

	Shipment from:	Shipped to:	Pounds	Totals
MARCH 20. By the S. S. "Romeo," at New York.				
Hood Rubber Co.	Singapore	Watertown	195,660	
Poel & Kelly	Singapore	New York	297,900	
Harburger & Stack	Singapore	New York	50,400	
William H. Stiles & Co.	Singapore	New York	78,400	
L. Littlejohn & Co., Inc.	Singapore	New York	78,400	
Baring Bros.	Singapore	New York	1,980	
Goldman, Sachs & Co.	Singapore	New York	20,160	
Hood Rubber Co.	Singapore	Watertown	222,382	
Rogers-Pyatt Shellac Co.	Singapore	New York	140,040	
E. H. Leland & Co.	Singapore	New York	12,600	
F. R. Henderson & Co.	Singapore	New York	168,480	
Thornett & Fehr	Singapore	New York	189,540	
Pennsylvania Rubber Co.	Singapore	Jeanette	107,280	
The Fisk Rubber Co.	Singapore	Chicopee Falls	27,249	
Various	Singapore	New York	351,089	
Aldens' Successors, Inc.	Penang	New York	10,080	
Various	Teluk Anson	New York	9,360	
F. R. Henderson & Co.	Port Dickson	New York	23,940	
Aldens' Successors, Inc.	P't Sw't'nh'm	New York	28,260	
Various	Belawan-Deli	New York	79,660	2,092,860
MARCH 21. By the S. S. "West Kasson," at New York.				
L. Littlejohn & Co., Inc.	Colombo	New York	85,960	85,960
MARCH 23. By the S. S. "Hathaway," at New York.				
Manhattan Rub. Mfg. Co.	T'jong-Priok	New York	45,000	
East Asiatic Co., Inc.	T'jong-Priok	New York	106,020	
Various	T'jong-Priok	New York	38,520	
Henderson, Forbes & Co.	Soerabaya	New York	18,360	
The Goodyear Tire & Rubber Co.	Colombo	Akron	203,040	
Henderson, Forbes & Co.	Singapore	New York	208,260	
East Asiatic Co., Inc.	Singapore	New York	16,560	
F. R. Henderson & Co.	Singapore	New York	51,840	
J. T. Johnstone & Co., Inc.	Singapore	New York	67,200	
Mitsui & Co., Ltd.	Singapore	New York	61,560	
Fred Waterhouse Co., Ltd.	Singapore	New York	38,340	
Fred Stern & Co.	Singapore	New York	11,200	
William H. Stiles & Co.	Singapore	New York	44,800	
L. Littlejohn & Co., Inc.	Singapore	New York	224,000	
Baring Bros.	Singapore	New York	40,320	
Hood Rubber Co.	Singapore	Watertown	124,728	
The Goodyear Tire & Rubber Co.	Singapore	Akron	717,840	
General Rubber Co.	Singapore	New York	403,560	
Poel & Kelly	Singapore	New York	452,880	
Firestone Tire & Rubber Co.	Singapore	Akron	102,960	
General Rubber Co.	Singapore	Montreal	180,480	
Various	Singapore	New York	458,312	3,615,780
MARCH 24. By the S. S. "West Sequana," at Boston.				
Hood Rubber Co.	Colombo	Watertown	54,200	54,200
MARCH 24. By the S. S. "West Sequana," at New York.				
Thornett & Fehr	Colombo	New York	10,080	
Various	Colombo	New York	46,060	56,140
MARCH 26. By the S. S. "City of Sparta," at New York.				
L. Littlejohn & Co., Inc.	Colombo	New York	138,865	
Meyer & Brown, Inc.	Colombo	New York	89,600	
H. A. Astlett Co.	Colombo	New York	80,000	308,465
MARCH 27. By the S. S. "Half Moon," at New York.				
Poel & Kelly	Singapore	New York	93,960	
The Fisk Rubber Co.	Singapore	Chicopee Falls	96,586	
East Asiatic Co., Inc.	Soerabaya	New York	151,740	342,286
MARCH 27. By the S. S. "Tokaaka Maru," at New York.				
Dumarest Bros.	Colombo	New York	66,960	
General Rubber Co.	Colombo	New York	190,800	257,760
MARCH 30. By the S. S. "Valacia," at New York.				
Goldman, Sachs & Co.	London	New York	691,380	
Various	London	New York	199,440	890,820
APRIL 2. By the S. S. "Rotterdam," at New York.				
Chas. T. Wilson Co., Inc.	Rotterdam	New York	46,371	
L. Littlejohn & Co., Inc.	Rotterdam	New York	56,191	
Various	Rotterdam	New York	419,258	521,820
APRIL 4. By the S. S. "Celtic Prince," at New York.				
Hood Rubber Co.	Singapore	Watertown	67,200	67,200
APRIL 6. By the S. S. "Clan Mackinnon," at New York.				
W. T. Sargent & Sons.	Cochin	New York	37,800	
Various	Cochin	New York	18,360	56,160
APRIL 6. By the S. S. "Trekieve," at New York.				
Baring Bros.	Colombo	New York	201,600	
Meyer & Brown, Inc.	Colombo	New York	392,000	
L. Littlejohn & Co., Inc.	Colombo	New York	404,020	
J. T. Johnstone & Co., Inc.	Colombo	New York	35,800	
Various	Colombo	New York	145,160	1,178,580
APRIL 6. By the S. S. "Trekieve," at Boston.				
Hood Rubber Co.	Colombo	Watertown	168,000	168,000
APRIL 9. By the S. S. "Gaelic Prince," at New York.				
Aldens' Successors, Inc.	Singapore	New York	117,180	
Poel & Kelly	Singapore	New York	193,500	
Balfour, Williamson & Co.	Singapore	New York	61,920	
G. Amsinck & Co., Inc.	Singapore	New York	10,440	
East Asiatic Co., Inc.	Singapore	New York	219,780	
The Fisk Rubber Co.	Singapore	Chicopee Falls	161,006	
General Export & Commission Co.	Singapore	New York	12,780	
William H. Stiles & Co.	Singapore	New York	291,200	
L. Littlejohn & Co., Inc.	Singapore	New York	1,215,120	
H. A. Astlett & Co.	Singapore	New York	120,000	
Edward Boustead & Co.	Singapore	New York	3,600	
The Goodyear Tire & Rubber Co.	Singapore	Akron	425,520	
W. R. Grace & Co.	Singapore	New York	36,180	
J. T. Johnstone & Co., Inc.	Singapore	New York	235,200	
Meyer & Brown, Inc.	Singapore	New York	56,000	
General Rubber Co.	Singapore	New York	120,420	
Rubber Importers & Dealers Co.	Singapore	New York	40,320	
American Trading Co.	Singapore	New York	88,740	
Rogers-Pyatt Shellac Co.	Singapore	New York	68,400	
Hood Rubber Co.	Singapore	Watertown	134,537	
Chas. T. Wilson Co., Inc.	Singapore	New York	33,600	
Fred Stern & Co.	Singapore	New York	78,400	
Paterson, Simmons & Co.	Singapore	New York	187,020	
Various	Singapore	New York	1,341,897	
Thornett & Fehr.	Penang	New York	10,080	
Edward Boustead & Co.	Penang	New York	57,600	5,320,440
APRIL 10. By the S. S. "Amur Maru," at New York.				
Baird Rubber & Trading Co.	Singapore	New York	122,400	
Poel & Kelly	Singapore	New York	79,920	
Thornett & Fehr	Singapore	New York	127,080	
Fred Stern & Co.	Singapore	New York	22,400	
L. Littlejohn & Co., Inc.	Singapore	New York	112,200	464,000
APRIL 14. By the S. S. "Indianic," at New York.				
Pacific Trading Co.	Colombo	New York	85,680	
Chas. T. Wilson Co., Inc.	Colombo	New York	56,020	
L. Littlejohn & Co., Inc.	Colombo	New York	201,600	
Baird Rubber & Trading Co.	Colombo	New York	58,240	
Various	Colombo	New York	374,060	775,600
APRIL 14. By the S. S. "Indianic," at Boston.				
Hood Rubber Co.	Colombo	Watertown	150,500	150,500
APRIL 14. By the S. S. "City of Agra," at New York.				
L. Littlejohn & Co., Inc.	Singapore	New York	156,800	
F. R. Henderson & Co.	Singapore	New York	100,800	
Baird Rubber & Trading Co.	Singapore	New York	56,000	
Goldman Sachs & Co.	Singapore	New York	60,480	
McAllister Bros.	Singapore	New York	68,040	
Mitsubiski Goshi Kaisha.	Singapore	New York	33,660	
Rubber Importers & Dealers Co., Inc.	Singapore	New York	142,920	
J. T. Johnstone & Co., Ltd.	Singapore	New York	89,820	
Fred Stern & Co.	Singapore	New York	67,200	
H. A. Astlett Co.	Singapore	New York	95,000	
Various	Singapore	New York	46,920	
Thornett & Fehr.	Penang	New York	30,240	
Edward Boustead & Co.	Penang	New York	28,800	
F. R. Henderson & Co.	Penang	New York	30,240	
General Rubber Co.	Belawan-Deli	New York	48,240	
Thornett & Fehr.	Belawan-Deli	New York	10,980	
Various	Belawan-Deli	New York	25,200	1,091,340
APRIL 14. By the S. S. "Agamemnon," at New York.				
Fisk Rubber Co.	Singapore	Chicopee Falls	8,960	
F. R. Henderson & Co.	Singapore	New York	71,460	
L. Littlejohn & Co., Inc.	Singapore	New York	356,000	
E. G. Curry & Co., Inc.	Singapore	New York	50,400	
Chas. T. Wilson Co., Inc.	Singapore	New York	77,971	
Hood Rubber Co.	Singapore	Watertown	22,400	
Jaeger & Co.	Singapore	New York	41,760	
Rubber Importers & Dealers Co., Inc.	Singapore	New York	50,400	
Baring Bros.	Singapore	New York	60,480	
J. T. Johnstone & Co., Inc.	Singapore	New York	44,800	
Baird Rubber & Trading Co.	Singapore	New York	56,000	
Smith & Schippers	Singapore	New York	100,800	
Far East Importing Co.	Singapore	New York	180	
Fred B. Peterson	Singapore	New York	180	
H. A. Astlett Co.	Singapore	New York	55,000	
Chas. T. Wilson Co., Inc.	Belawan-Deli	New York	108,540	
F. R. Henderson & Co.	Belawan-Deli	New York	3,600	
Meyer & Brown, Inc.	Belawan-Deli	New York	23,760	
W. T. Sargent & Sons.	Colombo	New York	34,740	
Pablo Calvet & Co.	Colombo	New York	50,400	
Baird Rubber & Trading Co.	Colombo	New York	33,600	
Meyer & Brown, Inc.	Colombo	New York	331,520	1,582,951
APRIL 16. By the S. S. "Ryndam," at New York.				
L. Littlejohn & Co., Inc.	Java	New York	108,004	
Thornett & Fehr.	Rotterdam	New York	12,240	
Chas. T. Wilson Co., Inc.	Rotterdam	New York	44,800	
Various	Rotterdam	New York	486,736	651,780
APRIL 18. By the S. S. "West Coddoa." at New York.				
The Goodyear Tire & Rubber Co.	Colombo	Akron	49,860	49,860
APRIL 19. By the S. S. "Trafford Hall," at New York.				
Hood Rubber Co.	Singapore	Watertown	123,590	123,590
APRIL 20. By the S. S. "Esther Dollar," at New York.				
Meyer & Brown, Inc.	Singapore	New York	324,800	324,800
APRIL 20. By the S. S. "Eastern Knight," at New York.				
Meyer & Brown, Inc.	Batavia	New York	56,000	56,000
APRIL 22. By the S. S. "Bolton Castle," at New York.				
Hood Rubber Co.	Singapore	Watertown	168,060	
J. T. Johnstone & Co., Inc.	Singapore	New York	78,400	246,460
CENTRALS				
MARCH 29. By the S. S. "Pastores," at New York.				
Isaac Brandon & Bros.	Cristobal	New York	300	300
APRIL 14. By the S. S. "Gen. G. W. Goethals," at New York.				
Pablo Calvet & Co.	Cristobal	New York	3,300	3,300
APRIL 15. By the S. S. "Gen. H. F. Hodges," at New York.				
Baring Bros.	Cristobal	New York	4,200	4,200

AFRICANS

	from: Shipment	Shipped to:	Pounds	Totals
MARCH 27. By the S. S. "Barrbacenia," at New York.				
Colonial Raw Products Co.	Lisbon	New York	20,717	
Various	Lisbon	New York	565,873	586,590
APRIL 16. By the S. S. "France," at New York.				
Various	Havre	New York	125	125

PONTIANAK

MARCH 18. By the S. S. "Laomedon," at New York.				
Various	Singapore	New York	27,000	27,000
MARCH 20. By the S. S. "Romeo," at New York.				
Baring Bros.	Singapore	New York	300	300
MARCH 23. By the S. S. "Hathaway," at New York.				
Fred Waterhouse Co., Ltd.	Singapore	New York	4,500	
Various	Singapore	New York	60,000	64,500
APRIL 14. By the S. S. "City of Agra," at New York.				
Various	Singapore	New York	132,900	132,900

GUTTA SIAK

APRIL 10. By the S. S. "Amur Maru," at New York.				
Various	Singapore	New York	120,000	120,000

BALATA

MARCH 20. By the S. S. "Ebro," at New York.				
G. Amsinck & Co., Inc.	Valparaiso	New York	3,150	3,150
MARCH 25. By the S. S. "Mayaro," at New York.				
South & Central America Commercial Co.	Trinidad	New York	18,450	18,450
MARCH 26. By the S. S. "Tivives," at New York.				
P. R. Rincorres, Jr., Co.	Port Colombia	New York	3,000	3,000
APRIL 6. By the S. S. "Allianca," at New York.				
Fidanque Brothers & Sons	Cristobal	New York	1,650	1,650
APRIL 11. By the S. S. "Maraval." at New York.				
South & Central America Commercial Co.	Trinidad	New York	55,950	
Middleton & Co.	Cayenne	New York	3,890	
Boss & Co.	Trinidad	New York	14,250	
G. Amsinck & Co., Inc.	Trinidad	New York	14,100	
Ultramares Corporation.	Trinidad	New York	30,150	118,340
APRIL 15. By the S. S. "Caracas." at New York.				
Ultramares Corporation.	Cristobal	New York	24,150	24,150
APRIL 16. By the S. S. "Quilpue," at New York.				
American Trading Co.	Guayaquil	New York	1,500	1,500

CUSTOM HOUSE STATISTICS

NEW YORK

IMPORTS

	February 1920 Pounds	February 1920 Value	February 1921 Pounds	February 1921 Value
UNMANUFACTURED—*free:*				
Balata:				
From Netherlands	87,320	$57,588	.....	.....
England	20,267	16,864	.....	.....
Panama	2,166	917	125	$25
Brazil	1,495	747	3,373	675
Colombia	36,168	13,459	3,039	949
Ecuador	2,336	935	.....	.....
British Guiana	30,359	24,604	.....	.....
Dutch Guiana	4,397	3,626	.....	.....
Venezuela	143,787	65,549	84,943	54,178
Trinidad	.....	.....	95,876	58,605
Totals	328,295	$184,289	187,356	$114,432
Jelutong (Pontianak):				
From England	274,145	$20,022	56,000	$8,860
Straits Settlements	1,018,171	136,392	110,468	13,383
Dutch East Indies	.....	.....	201,124	25,573
Totals	1,292,316	$156,414	367,592	$47,816
Gutta percha:				
From Netherlands	110	$170	.....	.....
Straits Settlements	250,641	52,085	.....	.....
Siam	1,464	374	.....	.....
Dutch East Indies	.....	.....	251,611	$42,406
Totals	252,215	$52,629	251,611	$42.406
Crude rubber:				
From Belgium	340,926	$96,699	.....	.....
France	827,307	243,229	.....	.....
Netherlands	2,586,622	1,123,583	360,640	$74,928
Portugal	220,462	44,000	.....	.....
England	15,383,717	7,312,311	66,981	11,303
Guatemala	2,518	503	484	121
Honduras	960	265	.....	.....
Nicaragua	2,750	1,173	.....	.....
Panama	1,084	395	375	75
Mexico	37,007	11,106	.....	.....
Trinidad	4,245	3,203	25	5
Bolivia	20,397	7,910	.....	.....
Brazil	3,807,367	1,117,767	1,147,121	210,290
Colombia	88,071	28,162	3,673	877
Ecuador	287,998	69,122	954	143
British Guiana	5,973	5,449	.....	.....
Peru	1,722,297	557,203	.....	.....
Uruguay	23,586	9,800	.....	.....
Venezuela	93,460	35,369	.....	.....
British India	301,293	139,066	.....	.....
Straits Settlements	21,732,218	9,393,584	13,788,173	4,891,002
British East Indies	7,128,151	2,921,947	2,786,670	457,243
Dutch East Indies	2,007,125	671,077	3,169,471	1,037,256
Philippine Islands	61,618	23,764	.....	.....
Costa Rica	.....	.....	750	188
Dutch Guiana	.....	.....	23,505	11,737
China	.....	.....	29,135	10,197
British India	.....	.....	166,791	51,073
Totals	56,687,152	$23,876,687	21,544,748	$6,756,438
Rubber scrap and reclaimed	643,220	57,508	215,310	11,826
Totals, unmanufactured	59,203,198	$24,327,527	22,566,617	$6,972,918
Manufactures of rubber and gutta percha	.....	$27,949	.....	$47,761
Rubber substitutes	11,200	2,017	796	250
Chicle *dutiable*	453,054	353,013	212,954	109,350

EXPORTS

Belting	.....	$109,893	.....	$114,432
Hose	.....	202,368	.....	276,262
Packing	.....	68,962	.....	65,978
Rubber boots *pairs*	24,658	97,200	3,754	15,465
Rubber shoes *pairs*	887,062	743,205	157,862	188,917
Druggists' sundries	.....	90,766	.....	81,421
Automobile tires	.....	3,199,706	.....	951,299
Other tires	.....	52,731	.....	19,717
Inner tubes	.....	142,146	.....	93,467
Solid tires	.....	141,519	.....	84,921
Soles and heels	.....	47,222	.....	55,087
Other rubber manufactures	.....	378,918	.....	369,491
Totals, manufactured	.....	$4,895,718	.....	$2,316,457
Chewing gum	.....	$277,561	.....	$33,773
Insulated wire	.....	500,687	.....	1,046,512
Fountain pens *number*	17,358	13,895	35,222	55,265
Suspenders and garters	.....	236,503	.....	49,575
Totals	.....	$1,028,646	.....	$1,185,125
UNMANUFACTURED—*free:*				
Rubber scrap and reclaimed	285,365	$37,200	582,364	$42,118

FOREIGN EXPORTS

Balata	.....	.....	82,163	$29,391
Crude rubber	.....	.....	51,359	7,079
Rubber manufactures	.....	$1,034	.....	12,049
Rubber substitutes	14,540	10,553	.....	.....

MASSACHUSETTS

IMPORTS

UNMANUFACTURED—*free:*				
Crude rubber:				
From England	256,075	$119,242	.....	.....
British East Indies	.....	.....	125,000	$30,545
Totals, unmanufactured	256,075	$119,242	125,000	$30,545
Rubber manufactures *dutiable*	.....	$15,951	.....	$2,968

EXPORTS

MANUFACTURED:				
Automobile tires	.....	$2,926	.....	$289
Inner tubes	.....	.....	.....	29
Solid tires	.....	.....	.....	14
Belting	.....	2,221	.....	.....
Hose	.....	57	.....	1,920
Packing	.....	.....	.....	18
Rubber boots *pairs*	141	9,378	2,061	7,491
Rubber shoes *pairs*	119,196	105,391	9,475	8,697
Druggists' sundries	.....	2,902	.....	684
Soles and heels	.....	10,450	.....	1,491
Other rubber manufactures	.....	13,443	.....	17,014
Totals	.....	$146,768	.....	$37,647
Insulated wire	.....	$9,307	.....	$344
Suspenders and garters	.....	8,981	.....	2,054

PHILADELPHIA

IMPORTS

Rubber scrap and reclaimed	.....	.....	55,066	$1,515
Rubber manufactures *dutiable*	.....	$449	.....	85

EXPORTS

Automobile tires	.....	$28,956	.....	$36,950
Inner tubes	.....	4,973	.....	6,643
Solid tires	.....	6,504	.....	.....
Belting	.....	.....	.....	326
Hose	.....	29,433	.....	47,319
Packing	.....	7,880	.....	489
Druggists' sundries	.....	351	.....	398
Other rubber manufactures	.....	2,792	.....	668
Totals	.....	$80,889	.....	$92,793
Insulated wire	.....	$13,782	.....	.....
Suspenders and garters	.....	1,856	.....	.....
Rubber scrap and reclaimed	128,074	7,412	103,030	$6,586

NEW ORLEANS

IMPORTS

UNMANUFACTURED—*free:*				
Crude rubber:				
From Mexico	18,383	$12,618	.....	.....
Straits Settlements	391,995	201,606	.....	.....
Totals	410,378	$214,224	.....	.....
Chicle *dutiable*	.....	.....	20	$12

EXPORTS

	February 1920 Pounds	February 1920 Value	February 1921 Pounds	February 1921 Value
MANUFACTURED:				
Automobile tires	.....	$9,561	.....	$8,364
Inner tubes	.....	1,778	.....	1,312
Solid tires	.....	106	.....	2,446
Other tires	.....	870	.....	76
Belting	.....	410	.....	14,460
Hose	.....	1,649	.....	3,453
Packing	.....	726	.....	291
Rubber boots.....*pairs*	.....	.....	1	19
Rubber shoes.....*pairs*	4,159	4,941	14,761	20,114
Soles and heels	.....	213	.....	148
Druggists' sundries	.....	89	.....	248
Other rubber manufactures	.....	1,654	.....	1,188
Totals	.....	$21,997	.....	$52,119
Insulated wire	.....	$7,003	.....	$4,706
Suspenders and garters	.....	1,610	.....	126
Chewing gum	.....	2,810	.....	1,318

SAN FRANCISCO

IMPORTS

UNMANUFACTURED—*free:*				
Crude rubber:				
From Straits Settlements	4,990,619	$2,035,230	102,850	$18,509
Dutch East Indies	40,680	30,275	.....	.....
Hong Kong	112	56	.....	.....
Philippine Islands	180	90	.....	.....
Totals	5,031,591	$2,065,651	102,850	$18,509
Jelutong (Pontianak):				
From Straits Settlements	.....	.....	10,973	$1,444
Totals	.....	.....	10,973	$1,444
Rubber scrap and reclaimed	.....	.....	110	11
Totals, unmanufactured	5,031,591	$2,065,651	113,933	$19,964
Rubber manufactures.*dutiable*	.....	$281	.....	.....
Chicle .....*dutiable*	30,305	37,578	.....	.....

EXPORTS

MANUFACTURED:				
Automobile tires	.....	$198,580	.....	$12,051
Inner tubes	.....	16,077	.....	1,698
Solid tires	.....	14,471	.....	3,307
Other tires	.....	1,475	.....	15,247
Belting	.....	8,699	.....	20,712
Hose	.....	8,578	.....	14,212
Packing	.....	16,178	.....	18,152
Rubber boots.....*pairs*	5,025	16,976	168	531
Rubber shoes	2,004	2,055	1,266	1,413
Soles and heels	.....	1,496	.....	55
Druggists' sundries	.....	2,744	.....	1,579
Other rubber manufactures	.....	15,063	.....	4,049
Totals	.....	$302,392	.....	$93,006
Insulated wire	.....	$13,908	.....	$6,796
Fountain pens.....*number*	228	441	169	364
Suspenders and garters	.....	2,429	.....	1,430
Chewing gum	.....	6,696	.....	100
Rubber scrap and reclaimed	737,570	41,957	.....	.....

WASHINGTON

IMPORTS

UNMANUFACTURED—*free:*				
Crude rubber:				
From Canada	9,820	$4,630	.....	.....
British India	558,381	267,848	.....	.....
Straits Settlements	3,627,602	1,659,988	.....	.....
Japan	69,450	34,500	.....	.....
Totals	4,265,253	$1,966,966	.....	.....
Rubber scrap and reclaimed	60,867	$2,034	.....	.....
Totals, unmanufactured	4,326,120	$1,969,000	.....	.....
Rubber manufactures.*dutiable*	.....	$257	.....	$20

EXPORTS

MANUFACTURED:				
Automobile tires	.....	$39,318	.....	$206
Inner tubes	.....	4,532	.....	.....
Solid tires	.....	1,034	.....	80
Other tires	.....	13	.....	.....
Belting	.....	1,083	.....	888
Hose	.....	436	.....	894
Packing	.....	294	.....	379
Rubber boots.....*pairs*	569	2,505	79	320
Rubber shoes .....*pairs*	.....	.....	2,449	2,083
Soles and heels	.....	755	.....	.....
Druggists' sundries	.....	487	.....	403
Other rubber manufactures	.....	1,820	.....	6,874
Totals	.....	$52,277	.....	$12,127
Insulated wire	.....	$440	.....	.....
Fountain pens.....*number*	.....	.....	20	$21
Suspenders and garters	.....	1,226	.....	89
Rubber scrap and reclaimed	271,743	12,953	.....	.....

BUFFALO

IMPORTS

Rubber scrap and reclaimed	.....	.....	7,363	$381
Rubber manufactures.*dutiable*	.....	.....	.....	1,500

EXPORTS

	February 1920 Pounds	February 1920 Value	February 1921 Pounds	February 1921 Value
MANUFACTURED:				
Automobile tires	.....	.....	.....	$58,565
Inner tubes	.....	.....	.....	7,322
Solid tires	.....	.....	.....	302
Other tires	.....	.....	.....	64
Belting	.....	.....	.....	4,020
Hose	.....	.....	.....	1,343
Packing	.....	.....	.....	1,910
Rubber shoes .....*pairs*	.....	.....	19	53
Druggists' sundries	.....	.....	.....	3,269
Other rubber manufactures	.....	.....	.....	77,382
Totals	.....	.....	.....	$154,229
Insulated wire	.....	.....	.....	$14,788
Fountain pens.....*number*	.....	.....	380	350
Suspenders and garters	.....	.....	.....	2,253
Chewing gum	.....	.....	.....	4
Rubber scrap and reclaimed	.....	.....	39,349	4,092

FOREIGN EXPORTS

Crude rubber	.....	.....	556,498	$106,933
Rubber manufactures	.....	.....	.....	2

CHICAGO

IMPORTS

Chicle .....*dutiable*	211,291	$148,049	743,235	$365,138
Rubber manufactures.*dutiable*	.....	123	.....	1,084

MICHIGAN

IMPORTS

Rubber scrap and reclaimed	13,639	$440	.....	.....
Rubber manufacturers.*dutiable*	.....	7,939	.....	$1,648

EXPORTS

MANUFACTURED:				
Automobile tires	.....	$87,899	.....	$546
Inner tubes	.....	16,071	.....	12
Solid tires	.....	336	.....	72
Other tires	.....	40	.....	341
Belting	.....	1,790	.....	901
Hose	.....	453	.....	317
Packing	.....	24	.....	164
Rubber boots .....*pairs*	1,824	6,618	1,068	3,495
Rubber shoes.....*pairs*	300	753	.....	.....
Soles and heels	.....	47	.....	.....
Druggists' sundries	.....	2,013	.....	1,054
Other rubber manufactures	.....	16,521	.....	9,201
Totals	.....	$132,565	.....	$16,103
Insulated wire	.....	$3,442	.....	$6,082
Fountain pens.....*number*	610	801	.....	.....
Suspenders and garters	.....	8,959	.....	927
Chewing gum	.....	431	.....	295
Rubber scrap and reclaimed	133,961	18,479	93,633	2,053

OHIO

IMPORTS

UNMANUFACTURED—*free:*				
Crude rubber:				
From Straits Setlements	1,885,852	$962,083	.....	.....
Dutch East Indies	348,112	157,728	.....	.....
Totals	2,233,964	$1,119,811	.....	.....
Rubber manufactures.*dutiable*	.....	$2,587	.....	$112

MICHIGAN

IMPORTS

	January 1920 Pounds	January 1920 Value	January 1921 Pounds	January 1921 Value
UNMANUFACTURED—*free:*				
Crude rubber:				
From England	56,205	$29,490	.....	.....
Totals	56,205	$29,490	.....	.....
Rubber scrap and reclaimed	4,804	$1,201	.....	.....
Rubber manufactures..*dutiable*	.....	2,319	.....	$488

EXPORTS

MANUFACTURED:				
Automobile tires	.....	$307	.....	$23,356
Inner tubes	.....	98	.....	2,470
Solid tires	.....	.....	.....	268
All other tires	.....	25	.....	50
Belting	.....	3,873	.....	1,162
Hose	.....	149	.....	630
Packing	.....	619	.....	220
Rubber boots .....*pairs*	1	3	.....	.....
Soles and heels	.....	13	.....	.....
Druggists' sundries	.....	149	.....	358
Other rubber manufactures	.....	10,327	.....	2,304
Totals	.....	$15,563	.....	$30,818
Insulated wire	.....	$7,150	.....	$17,964
Fountain pens .....*number*	210	230	.....	.....
Suspenders and garters	.....	2,632	.....	1,625
Rubber scrap and reclaimed	16,557	2,510	2,670	156

UNITED STATES CRUDE RUBBER IMPORTS FOR 1921 (BY MONTHS)

1921	Plantations	Parás	Africans	Centrals	Guayule	Manicoba and Matto Grosso	Balata	Miscellaneous	Waste	Totals 1921	Totals 1920
January ..... *tons*	12,819	1,312	43	3	.....	....	41	173	1,071	15,462	22,401
February	7,913	432	269	2	25	....	25	216	37	8,919	33,984
March	12,241	1,794	377	1	.....	3	29	7	345	14,797	33,998
Totals, 3 months, 1921.....	32,973	3,538	689	6	25	3	95	396	1,453	39,178	.....
Totals, 3 months, 1920.....	76,013	7,539	1,893	399	148	3	245	2,231	1,912	.....	90,383

Compiled by The Rubber Association of America, Inc.

UNITED KINGDOM RUBBER STATISTICS

IMPORTS

	Year Ended December 31 1919 Pounds	1919 Value	1920 Pounds	1920 Value
UNMANUFACTURED—				
Crude rubber:				
From—				
Straits Settlements.....	67,351,100	£7,107,882	66,516,400	£6,499,413
Federated Malay States...	62,862,200	6,628,845	67,151,200	6,860,824
British India.....	11,301,200	1,240,460	12,286,800	1,308,035
Ceylon and dependencies..	33,498,100	3,605,033	47,991,900	4,657,041
Other Dutch possessions in Indian Seas.....	12,283,200	1,286,691	8,608,600	870,634
Dutch East Indies (except other Dutch possessions in Indian Seas)	13,372,200	1,381,220	17,769,400	1,667,780
Other countries in the East Indies and Pacific not elsewhere specified	2,843,800	309,696	2,607,600	268,840
Brazil	18,121,400	1,997,385	18,354,400	1,793,766
Peru	1,184,200	120,349	216,700	20,261
South and Central America (except Brazil and Peru)	478,200	46,201	386,900	36,482
West Africa:				
French West Africa....	63,900	5,538	666,800	58,502
Gold Coast.....	315,200	29,953	231,100	22,239
Other parts of West Africa	1,821,700	172,040	1,210,100	104,379
East Africa (including Madagascar)	943,600	93,330	1,370,000	128,771
Other countries.....	1,797,700	187,263	3,000,200	259,161
Totals	228,237,700	£24,211,886	248,368,100	£24,556,128
Waste and reclaimed rubber.	4,992,400	135,661	8,401,700	165,905
Totals, unmanufactured.	233,230,100	£24,347,547	256,769,800	£24,722,033
Gutta percha and balata....	12,408,500	£2,142,354	10,190,000	£1,999,058
*Rubber substitutes.....	.....	.....	1,026,900	47,722
MANUFACTURED—				
Boots and shoes..*dozen pairs*	170,610	£294,338	280,481	£714,685
Waterproof clothing.....	.....	15,585	.....	13,174
Insulated wire.....	.....	7,446	.....	33,054
Submarine cables.....	.....	38	.....	50
Tires and tubes.....	.....	2,148,989	.....	5,577,078
Other rubber manufactures..	.....	557,640	.....	810,747

EXPORTS

UNMANUFACTURED—				
Waste and reclaimed rubber	10,636,600	£240,849	15,247,500	£397,763
*Rubber substitutes	.....	.....	2,870,300	123,346
MANUFACTURED—				
Boots and shoes..*dozen pairs*	131,206	£263,284	167,055	£358,743
Waterproof clothing.....	.....	1,728,828	.....	2,930,242
Insulated wire.....	.....	827,732	.....	1,752,916
Submarine cables.....	.....	622,633	.....	1,776,940
Tires and tubes.....	.....	4,257,651	.....	6,500,761
Other rubber manufactures..	.....	2,831,183	.....	4,689,739

EXPORTS—COLONIAL AND FOREIGN

UNMANUFACTURED—				
Crude rubber:				
To Russia.....	168,700	£22,151	139,800	£16,295
Sweden, Norway and Denmark	6,240,100	731,938	2,906,200	270,965
Germany	4,849,700	467,850	11,532,500	996,076
Belgium	8,417,300	710,955	4,845,100	546,455
France	23,953,200	2,579,919	26,701,000	3,034,798
Spain	646,800	71,733	517,400	54,147
Italy	9,994,400	1,091,585	6,024,800	692,953
Austria-Hungary	208,800	22,219	379,700	35,731
Other European countries	7,175,100	706,543	2,420,100	214,797
United States.....	63,863,500	6,779,508	55,661,100	6,890,203
Canada	6,121,300	655,768	7,270,100	825,124
Other countries.....	1,015,000	131,706	2,356,100	277,400
Totals, rubber....	132,653,900	£13,971,875	120,753,900	£13,854,944
Waste and reclaimed rubber	445,500	£17,382	152,600	£5,596
Gutta percha and balata.....	1,568,600	215,775	1,381,700	235,394
*Rubber substitutes	.....	.....	41,100	1,721
MANUFACTURED—				
Boots and shoes..*dozen pairs*	4,871	£10,195	6,757	£34,970
Waterproof clothing.....	.....	1,188	.....	669
Tires and tubes.....	.....	124,504	.....	481,808
Insulated wire.....	.....	7,905	.....	1,436
Other manufactures.....	.....	55,113	.....	42,759

*Included in "Other Articles," Class III, T., prior to 1920.

UNITED KINGDOM RUBBER STATISTICS

IMPORTS

	January 1920 Pounds	1920 Value	1921 Pounds	1921 Value
UNMANUFACTURED—				
Crude rubber:				
From—				
Straits Settlements	3,141,600	£398,543	8,252,700	£481,247
Federated Malay States....	4,341,400	526,304	7,710,500	445,846
British India	1,521,000	191,595	800,300	43,715
Ceylon and dependencies..	4,914,400	593,765	3,379,200	179,580
Other Dutch possessions in Indian Seas	457,900	55,621	1,227,800	73,595
Dutch East Indies (except other Dutch possessions in Indian Seas).....	1,291,500	152,410	1,481,200	82,869
Other countries in East Indies and Pacific, not elsewhere specified	107,400	13,149	295,300	14,954
Brazil	946,100	108,639	693,400	32,668
Peru	7,100	850	7,200	362
South and Central America (except Brazil and Peru)	47,600	5,830	13,300	676
West Africa:				
French West Africa....	33,700	3,241	.....	.....
Gold Coast	12,300	1,413	7,600	386
Other parts of W. Africa	82,400	8,506	57,000	2,631
East Africa (including Madagascar)	185,600	18,685	70,700	3,124
Other countries	135,500	13,565	131,800	6,582
Totals	17,225,500	£2,091,916	24,128,000	£1,368,235
Waste and reclaimed rubber.	776,000	20,637	328,900	5,281
Totals, manufactured.	18,001,500	£2,112,553	24,456,900	£1,373,516
Gutta percha and balata.....	816,300	£119,233	1,050,800	£195,312
*Rubber substitutes	400	33	43,700	1,187
MANUFACTURED—				
Boots and shoes—*dozen pairs*	35,372	£69,772	7,231	£22,712
Waterproof clothing	.....	130	.....	40
Insulated wire	.....	1,914	.....	2,478
Tires and tubes.....	.....	351,598	.....	309,122
Other rubber manufactures..	.....	117,710	.....	66,309

EXPORTS

UNMANUFACTURED—				
Waste and reclaimed rubber.	1,139,000	£25,676	610,700	£16,513
Rubber substitutes	729,100	13,627	54,100	1,985
Totals	1,898,100	£39,303	664,800	£18,498
MANUFACTURED—				
Boots and shoes..*dozen pairs*	10.416	£27,478	17,744	£43,316
Waterproof clothing	.....	258,819	.....	94,053
Insulated wire	.....	112,574	.....	185,307
Submarine cables	.....	81,323	.....	93,498
Tires and tubes.....	.....	475,946	.....	351,672
Other rubber manufactures...	.....	288,036	.....	360,584

EXPORTS—COLONIAL AND FOREIGN

UNMANUFACTURED—				
Crude rubber:				
To Russia.....	8,300	£1,280	.....	.....
Sweden, Norway, Denmark	129,100	11,707	360,300	£21,217
Germany	554,800	55,130	880,500	44,549
Belgium	484,000	53,581	254,200	14,452
France	2,361,500	280,450	547,000	32,922
Spain	31,600	3,812	16,500	922
Italy	305,900	33,668	357,800	16,204
Austria-Hungary	11,200	1,200	29,700	1,666
Other European Countries	187,700	19,136	185,700	12,064
United States.....	12,599,800	1,554,547	398,600	46,315
Canada	1,452,800	174,805	23,500	700
Other countries.....	239,100	30,935	27,800	1,644
Totals, rubber	18,365,800	£2,220,251	3,081,600	£192,655
Waste and reclaimed rubber..	.....	.....	900	35
Totals, unmanufactured..	18,365,800	£2,220,251	3,082,500	£192,690
Gutta percha and balata.....	123,400	21,190	15,700	3,656
MANUFACTURED—				
Boots and shoes...*dozen pairs*	609	£4,359	578	£2,885
Tires and tubes.....	.....	2,464	.....	67,541
Other manufactures	.....	5,714	.....	2,281
Totals, manufactured..	.....	£12,537	.....	£72,707

EXPORTS OF INDIA RUBBER MANUFACTURES AND INSULATED WIRE AND CABLE FROM THE UNITED STATES BY COUNTRIES, DURING THE MONTH OF JANUARY, 1921.

EXPORTED TO—	Belting Value	Hose Value	Packing Value	Boots Pairs	Boots Value	Shoes Pairs	Shoes Value	Soles and Heels Value	Automobile Tires: Casings Value	Automobile Tires: Inner Tubes Value	Automobile Tires: Solid Tires Value	Automobile Tires: All Others Value	Insulated Wire and Cables Value	Druggists' Rubber Sundries Value	All Other Manufactures of Rubber Value	Totals Value
EUROPE:																
Azores and Madeira Islands	$368	$2,104	.....	.....	.....	.....	.....	.....	$39	$4	.....	.....	.....	.....	.....	$2,515
Belgium	.....	109	$892	.....	.....	7,032	$8,032	.....	8,734	662	.....	.....	$4,463	$41	$1,614	24,547
Bulgaria	.....	807	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	807
Czechoslovakia	.....	.....	.....	.....	.....	.....	.....	.....	320	74	.....	.....	.....	.....	.....	394
Denmark	1,090	958	625	50	$50	30,819	29,275	.....	21,146	650	$1,353	$150	8,871	.....	2,791	66,959
Finland	.....	56	290	.....	.....	.....	.....	.....	881	.....	.....	350	200	.....	108	1,885
France	9,033	5,215	1,753	.....	.....	1,033	997	.....	79,117	106	.....	28	45,858	2,064	36,169	180,340
Germany	1,947	.....	.....	.....	.....	75	90	.....	9,129	1,221	.....	.....	.....	.....	1,130	13,517
Gibraltar	.....	.....	.....	.....	.....	.....	.....	.....	195	.....	.....	.....	.....	.....	.....	195
Greece	.....	6,048	.....	.....	.....	.....	.....	.....	3,427	249	.....	.....	2,692	.....	594	13,010
Hungary	.....	.....	.....	.....	.....	.....	.....	$275	.....	.....	.....	.....	.....	.....	.....	275
Iceland and Faroe Islands	.....	.....	.....	996	2,853	6,028	8,291	.....	.....	.....	.....	.....	.....	.....	.....	11,144
Italy	.....	.....	.....	.....	.....	.....	.....	.....	249	21	.....	.....	19,764	1,178	10,430	31,642
Malta, Gozo, and Cyprus Islands	.....	.....	.....	.....	.....	.....	.....	.....	750	.....	.....	.....	.....	.....	10	760
Netherlands	.....	782	552	.....	.....	6,321	6,825	.....	9,693	944	.....	231	133,546	11,083	2,905	166,561
Norway	4,095	728	.....	968	1,805	118,650	120,599	749	26,321	664	5,806	.....	2,199	126	2,147	165,239
Poland and Danzig	.....	.....	.....	.....	.....	.....	.....	340	540	60	.....	.....	.....	4,290	.....	5,230
Portugal	.....	.....	.....	.....	.....	920	1,315	.....	.....	.....	.....	.....	.....	366	237	1,918
Roumania	.....	23	105	72	291	4	8	.....	6,761	1,929	.....	.....	859	.....	265	10,241
Spain	775	10,065	.....	1	6	5,669	6,042	10,000	79,410	4,383	3,394	17,000	24,170	6,451	15,492	177,188
Sweden	7,463	4,760	1,082	101	405	11,722	32,863	.....	74,859	6,650	6,690	.....	427,299	265	15,268	577,604
Switzerland	774	200	.....	.....	.....	24,638	25,465	.....	6,635	89	.....	1,264	6,890	.....	2,793	44,110
Turkey in Europe	.....	1,059	.....	.....	.....	19,061	19,319	.....	25,037	2,370	.....	.....	213	100	1,617	49,715
England	12,650	77,530	5,706	1,901	7,260	12,300	10,735	7,501	288,497	3,394	55,364	1,586	77,423	19,265	157,392	724,303
Scotland	29,947	.....	833	.....	.....	1,330	1,445	.....	2,301	13	.....	.....	5,244	.....	495	40,278
Ireland	.....	.....	.....	.....	.....	.....	.....	.....	53	8	.....	.....	.....	.....	2,776	2,837
Jugoslavia, Albania, etc	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,530	.....	.....	1,530
TOTALS, EUROPE	$68,142	$110,444	$11,838	4,089	$12,670	245,602	$271,301	$18,865	$644,094	$23,491	$72,607	$20,609	$761,221	$45,229	$254,233	$2,314,744
NORTH AMERICA:																
Bermuda	$133	$1,713	$280	76	$282	3,023	$5,037	$159	$128	.....	.....	$10	$2,090	$323	$1,105	$11,260
British Honduras	.....	138	.....	.....	.....	314	451	27	206	$432	.....	.....	90	69	19	1,432
Canada	8,120	6,042	9,859	351	1,067	4,857	5,546	.....	62,245	7,393	$4,680	2,575	31,466	23,712	91,328	254,033
Costa Rica	2,081	1,120	786	.....	.....	72	89	811	1,128	171	300	400	4,741	281	1,202	13,110
Guatemala	2,313	753	294	.....	.....	1,142	1,507	1,485	7,533	881	.....	.....	3,036	1,846	5,203	24,851
Honduras	190	2,708	162	.....	.....	600	1,016	45	1,365	83	.....	.....	1,199	1,026	2,488	10,282
Nicaragua	1,221	85	44	.....	.....	234	371	3,280	3,448	150	.....	183	1,562	447	509	11,300
Panama	6,961	22,915	6,829	65	332	5,182	6,375	4,868	17,899	8,544	1,566	1,662	11,565	311	3,555	93,382
Salvador	.....	759	255	.....	.....	264	320	.....	13,376	2,612	422	402	822	166	262	19,396
Mexico	31,431	140,945	46,260	134	466	32,179	49,429	11,722	116,163	17,350	4,692	1,739	245,916	23,095	55,254	744,462
Miquelon, Langley, etc	.....	.....	.....	48	79	264	186	.....	.....	.....	.....	.....	.....	.....	.....	265
Newfoundland and Labrador	381	382	267	2,507	7,854	1,592	2,688	.....	.....	.....	.....	.....	1,165	.....	805	13,542
Barbados	20	.....	46	.....	.....	342	458	.....	3,769	122	250	108	305	.....	897	5,975
Jamaica	1,856	1,416	1,622	.....	.....	4,024	4,938	1,283	18,297	1,291	2,040	243	4,769	412	1,860	40,027
Trinidad and Tobago	1,770	3,259	1,542	.....	.....	923	1,233	578	12,787	749	2,430	488	15,563	355	2,059	42,813
Other British West Indies	.....	273	158	.....	.....	2,425	2,875	.....	2,506	176	414	416	354	166	141	7,479
Cuba	26,096	52,782	18,459	1,164	4,215	227,702	236,131	11,358	226,717	13,089	35,500	9,542	266,648	22,910	35,874	959,321
Virgin Islands of United States	.....	18	.....	.....	.....	1,129	2,021	279	1,622	143	.....	.....	337	165	91	4,676
Dutch West Indies	.....	1,741	217	.....	.....	232	312	174	930	149	.....	.....	58	116	57	3,754
French West Indies	.....	.....	.....	.....	.....	7	13	.....	2,897	333	907	1,041	317	.....	282	5,790
Haiti	.....	735	139	.....	.....	424	486	37	6,636	1,205	.....	211	243	289	916	10,897
Dominican Republic	46	2,399	2,169	.....	.....	2,779	3,436	154	23,060	2,010	2,344	740	6,480	1,470	2,475	46,783
TOTALS, NORTH AMERICA	$82,619	$240,183	$89,388	4,345	$14,295	289,710	$324,918	$36,260	$522,712	$56,883	$55,545	$19,769	$598,726	$77,159	$206,382	$2,324,830
OCEANIA:																
Australia	$8,651	$5,788	$2,960	2,225	$7,591	1,544	$2,898	$1,740	$77,509	$5,452	$230	$2,163	$36,841	$2,095	$17,634	$171,552
New Zealand	11,703	894	1,694	6,201	25,628	2,526	2,643	724	128,696	1,843	3,032	23,741	40,339	1,244	11,952	254,133
Other British Oceania	.....	.....	.....	.....	.....	2,132	2,524	.....	4,632	1,097	148	25	.....	.....	.....	8,426
French Oceania	.....	100	.....	.....	.....	318	432	.....	1,161	75	.....	213	.....	.....	10	1,991
Other Oceania	.....	.....	.....	.....	.....	15	40	.....	34	.....	.....	.....	.....	.....	.....	74
Philippine Islands	11,061	11,232	9,122	1,149	2,430	137,456	172,803	24,647	90,609	17,513	22,429	4,190	89,421	4,628	28,822	488,907
TOTALS, OCEANIA	$31,415	$18,014	$13,776	9,575	$35,649	143,991	$181,340	$27,111	$302,641	$25,980	$25,839	$30,332	$166,601	$7,967	$58,418	$925,083
SOUTH AMERICA:																
Argentina	$17,587	$28,723	$2,115	.....	.....	36,252	$42,182	$2,577	$118,500	$11,944	$7,365	$750	$87,357	$14,902	$40,128	$374,130
Bolivia	710	.....	.....	132	$567	.....	.....	42	3,929	192	405	.....	41,447	68	128	47,488
Brazil	8,300	18,169	6,617	.....	.....	44,575	44,300	19,452	113,412	4,727	.....	810	222,541	4,335	23,135	465,798
Chile	12,193	9,348	5,641	12	32	14,162	13,789	241	17,018	1,707	2,214	100	160,424	3,846	21,905	248,458
Colombia	1,160	1,473	204	.....	.....	1,344	1,403	442	6,994	921	594	.....	23,569	4,752	5,214	46,726
Ecuador	.....	97	.....	.....	.....	724	795	.....	2,378	401	.....	.....	1,996	2,373	922	8,962
British Guiana	.....	163	857	.....	.....	1,537	2,158	.....	2,924	1,624	.....	.....	171	37	405	8,339
Dutch Guiana	.....	479	.....	.....	.....	66	66	64	2,038	198	.....	.....	109	83	108	3,145
French Guiana	.....	.....	.....	.....	.....	.....	.....	.....	100	76	.....	.....	.....	.....	.....	176
Paraguay	744	.....	.....	.....	.....	.....	.....	.....	280	124	.....	.....	.....	33	106	1,287
Peru	7,413	2,354	1,590	182	1,517	120	300	171	39,888	6,603	4,020	.....	21,899	2,754	9,294	97,803
Uruguay	.....	5,257	242	.....	.....	16,523	17,301	25	32,104	1,050	.....	.....	31,508	5,933	10,841	104,261
Venezuela	1,736	1,341	1,163	.....	.....	179	175	1,108	26,420	1,558	743	.....	7,304	1,606	4,545	47,699
TOTALS, SOUTH AMERICA	$49,843	$67,404	$18,429	326	$2,116	115,482	$122,469	$24,122	$365,985	$31,125	$15,341	$1,660	$598,325	$40,722	$116,731	$1,454,272

EXPORTED TO—	Belting Value	Hose Value	Packing Value	Boots Pairs	Boots Value	Shoes Pairs	Shoes Value	Soles and Heels Value	Automobile Tires Casings Value	Automobile Tires Inner Tubes Value	Automobile Tires Solid Tires Value	Automobile Tires All Others Value	Insulated Wire and Cables Value	Druggists' Rubber Sundries Value	All Other Manufactures of Rubber Value	Totals Value
ASIA:																
Aden	.....	.....	$3,056	.....	.....	2,528	$3,013	$98	$3,217	.....	$150	$163	$135,359	$4,149	$70	$3,287
China	$4,525	$5,979	.....	.....	.....	.....	.....	.....	25,864	$991	.....	.....	.....	.....	8,259	193,806
Kwantung, leased territory	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	6,983	.....	.....	7,667
Chosen	.....	494	.....	.....	.....	192	198	.....	199	.....	.....	.....	.....	.....	192	1,083
British India	14,284	14,623	2,366	72	$282	415	501	47	54,897	4,245	1,412	.....	66,505	1,483	9,134	169,979
Straits Settlements	847	.....	.....	.....	.....	3,528	4,752	.....	4,667	564	1,000	2,238	1,298	443	392	16,201
Other British East Indies	.....	.....	.....	.....	.....	288	326	81	.....	1,267	1,374	.....	.....	.....	234	4,070
Dutch East Indies	3,275	1,671	.....	.....	.....	48	47	350	23,206	3,787	10,973	1,612	90,128	593	1,377	137,019
French Indo China	.....	.....	517	.....	.....	.....	.....	.....	.....	.....	.....	.....	156	.....	110	783
Hongkong	.....	3,800	329	60	199	7,456	8,435	49	6,283	556	1,713	.....	354	5,482	871	28,071
Japan	3,907	2,026	1,472	5,496	15,721	39,644	42,635	163	13,165	696	6,387	69	6,619	1,394	43,784	140,038
Siam	.....	.....	.....	.....	.....	248	296	.....	6,350	100	.....	.....	.....	.....	143	6,889
Turkey in Asia	150	.....	.....	156	492	4,182	4,236	19	8,819	2,018	.....	.....	.....	17	401	16,155
TOTALS, ASIA	$28,988	$26,593	$9,940	5,784	$16,694	59,177	$65,123	$807	$147,455	$14,224	$23,009	$4,082	$307,602	$13,561	$64,970	$725,048
AFRICA:																
Belgian Kongo	$76	.....	.....	.....	$4	25	$41	.....	$8,698	$1,696	.....	.....	.....	$500	$106	$723
British West Africa	.....	.....	.....	1	.....	214	302	.....	.....	2,536	.....	$193	$77	2	41	10,220
British South Africa	25,664	$44,540	$2,641	.....	.....	1,981	2,150	$1,040	30,206	.....	.....	.....	13,845	1,722	9,368	133,895
British East Africa	.....	.....	.....	.....	.....	936	900	.....	9,249	.....	.....	.....	1,243	85	1,268	12,745
Canary Islands	.....	.....	.....	.....	.....	.....	.....	.....	2,703	115	.....	.....	.....	.....	.....	2,818
French Africa	.....	.....	.....	.....	.....	1	2	.....	1,753	390	1,010	.....	.....	28	500	3,743
Kamerun, etc.	.....	60	.....	2	13	.....	.....	.....	825	94	.....	.....	.....	32	.....	964
Liberia	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	14
Morocco	2,960	.....	.....	.....	.....	.....	.....	.....	940	156	.....	.....	.....	.....	.....	4,056
Portuguese Africa	.....	487	100	.....	.....	.....	.....	.....	.....	.....	1,066	.....	.....	.....	933	2,586
Egypt	.....	430	.....	.....	.....	3	4	.....	8,744	1,892	.....	69	.....	657	725	12,521
TOTALS, AFRICA	$28,700	$45,517	$2,741	3	$17	3,160	$3,399	$1,040	$63,118	$6,269	$2,076	$262	$15,179	$3,026	$12,941	$184,285
GRAND TOTALS	$289,707	$510,155	$146,112	24,122	$81,441	857,122	$968,550	$108,205	$2,046,005	$157,972	$194,417	$76,705	$2,447,654	$187,664	$713,675	$7,928,262

EXPORTS OF RUBBER GOODS TO NON-CONTIGUOUS TERRITORY OF UNITED STATES

	Belting Hose and Packing Value	Boots and Shoes Pairs	Boots and Shoes Value	Tires Automobile Value	Tires All Others Value	Insulated Wire and Cables Value	Druggists' Rubber Sundries Value	All Other Manufactures of Rubber Value	Totals Value
Hawaii	$17,848	.....	.....	$82,992	$2,010	.....	.....	$11,496	$114,346
Porto Rico	10,475	.....	.....	50,538	275	.....	.....	16,368	77,656
TOTALS	$28,323	.....	.....	$133,530	$2,285	.....	.....	$27,864	$192,002

Compiled by the Bureau of Foreign Commerce, Department of Commerce, Washington, D. C.

OFFICIAL INDIA RUBBER STATISTICS FOR THE UNITED STATES

IMPORTS OF CRUDE AND MANUFACTURED RUBBER

	January 1920 Pounds	January 1920 Value	January 1921 Pounds	January 1921 Value
UNMANUFACTURED—*free:*				
India rubber:				
From France	490,968	$198,476	.....	.....
Netherlands	1,522,588	722,320	100,800	35,280
Portugal	67,461	33,730	121,000	13,310
United Kingdom	17,104,210	8,024,335	636,468	178,011
Canada	2,585	1,034	.....	.....
Central America	28,376	8,971	.....	.....
Mexico	130,655	54,167	.....	.....
Brazil	4,233,199	1,405,944	2,432,665	310,032
Peru	176,721	65,118	60,681	11,661
Other South Am.	275,256	85,769	131,673	32,672
British E. Indies	35,167,439	14,215,918	20,705,400	6,410,431
Dutch E. Indies	6,171,319	2,684,769	2,617,357	905,494
Other countries	1,056,638	466,677	105,709	25,542
Totals	66,427,415	$27,967,228	26,911,753	$7,922,433
Balata	494,604	292,294	127,146	80,437
Jelutong (Pontianak)	1,215,892	172,049	170,147	20,630
Gutta Percha	816,999	133,742	53,327	8,011
Rubber scrap	981,719	82,046	165,176	10,417
Totals, unmanufactured	69,936,629	$28,647,359	27,427,549	$8,041,928
Chicle (dutiable)	1,203,546	$895,678	818,277	$428,922
MANUFACTURED—*dutiable:*				
India rubber and gutta percha	.....	$67,649	.....	$44,918
India rubber substitutes	4	5	.....	.....

EXPORTS OF DOMESTIC MERCHANDISE

MANUFACTURED—				
India rubber:				
Scrap and old	1,361,652	$124,891	952,265	$66,568
Reclaimed	339,979	60,609	118,828	20,840
Belting[1]	.....	213,779	.....	289,707
Hose[1]	.....	94,726	.....	510,155
Packing[1]	.....	50,230	.....	146,112
Boots[1] ..... *pairs*	42,441	149,928	24,122	81,441
Shoes[1] ..... *pairs*	1,197,236	1,202,206	857,122	968,550
Soles and heels[1]	.....	30,729	.....	108,205
Tires:				
Casings[1]	.....	$3,090,924	.....	$2,046,005
Inner tubes[1]	.....	92,320	.....	157,972
Solid tires[1]	.....	121,969	.....	194,417
All other tires[1]	.....	127,919	.....	76,705
Druggists' rubber sundries[1]	.....	90,145	.....	187,664
Suspenders and garters	.....	222,030	.....	176,821
Other rubber manufactures[1]	.....	664,890	.....	713,675
Totals manufactured	.....	$6,337,295	.....	$5,744,837
Fountain pens ..... *number*	35,907	$37,472	45,197	$68,749
Insulated wire and cables[1]	.....	661,842	.....	2,447,654

EXPORTS OF FOREIGN MERCHANDISE

UNMANUFACTURED—				
India rubber	563,677	$247,992	1,164,460	$237,383
Balata	54,958	32,698	.....	.....
Jelutong (Pontianak)	110,000	18,568	.....	.....
Gutta percha	.....	.....	74,467	12,497
Totals, unmanufactured	.....	$299,258	.....	$249,880
MANUFACTURED—				
Gutta percha	.....	$115	.....	$32,512
Totals, manufactured	.....	$115	.....	$32,512
India rubber substitutes	.....	.....	101	53

EXPORTS OF RUBBER GOODS TO NON-CONTIGUOUS TERRITORIES OF THE UNITED STATES

MANUFACTURED—				
To Alaska:				
Belting, hose and packing	.....	$5,114	.....	$975
Boots and shoes ..... *pairs*	3,177	9,934	2,696	9,276
Other rubber goods	.....	2,633	.....	1,856
Totals	.....	$17,681	.....	$12,107
To Hawaii:				
Belting, hose and packing	.....	$9,305	.....	$17,848
Automobile tires	.....	145,074	.....	82,992
Other tires	.....	5,706	.....	2,010
Other rubber goods	.....	8,905	.....	11,496
Totals	.....	$168,990	.....	$114,346
To Porto Rico:				
Belting, hose and packing	.....	$4,751	.....	$10,475
Automobile tires	.....	157,885	.....	50,538
Other tires	.....	20,171	.....	275
Other rubber goods	.....	13,957	.....	16,368
Totals	.....	$196,764	.....	$77,656

To Philippine Islands—treated as foreign commerce.

[1]Details of exports of domestic merchandise by countries during January, 1921, appear in this issue.

RUBBER STATISTICS FOR ITALY

IMPORTS OF CRUDE AND MANUFACTURED RUBBER

UNMANUFACTURED—	Nine Months Ended September 1919 Quintals[1]	1919 Lire[2]	1920 Quintals	1920 Lire
Crude rubber and gutta percha —raw and reclaimed:				
From Great Britain	57		654	
French Colonies in Asia	341		2,075	
British India and Ceylon	22,991		6,448	
Straits Settlements	40,428	89,741,750	26,062	48,661,850
French African Colonies	3,283		1,357	
Belgian Congo	710		2,064	
Brazil	25,798		10,439	
Other countries	858		2,144	
Totals	94,465	89,741,750	51,223	48,661,850
Rubber scrap	14,700	2,205,000	231	34,650
Totals, unmanufactured	109,165	91,946,750	51,454	48,696,500
MANUFACTURED—				
India rubber and gutta percha—				
Threads	188	545,200	273	791,700
Sheets, including hard rubber	114	221,800	235	455,600
Tubes	177	256,300	100	319,550
Belting	368	607,200	528	871,200
Rubber coated fabrics in pieces	427	901,400	654	1,281,200
Boots and shoes, *pairs*	34,075	681,500	119,850	2,397,000
Elastic webbing	290	986,000	379	1,288,600
Clothing and articles for travel	4	16,000	155	620,000
Tires and tubes:				
From Belgium	1		758	
France	3,473		4,255	
Great Britain	858	12,138,000	6,816	36,766,800
United States	2		1,265	
Other countries	1		37	
Other manufactures	11,999	22,536,300	16,097	30,143,100
Totals manufactured	.....	38,889,700	.....	74,934,750
Total imports	.....	130,836,450	.....	123,631,250

EXPORTS OF CRUDE AND MANUFACTURED RUBBER

UNMANUFACTURED—	Nine Months Ended September 1919 Quintals[1]	1919 Lire[2]	1920 Quintals	1920 Lire
India rubber and gutta percha— raw and reclaimed:				
To Australia	.....		543	
Spain	2,014		708	
United States	1,370	1,692,000	3,239	2,517,000
Other countries	.....		544	
Totals	3,384	1,692,000	5,034	2,517,000
Waste	2,669	533,800	6,725	1,345,000
Totals unmanufactured	6,053	2,225,800	11,759	3,862,000
MANUFACTURED—				
India rubber and gutta percha—				
Threads	412	1,277,200	263	815,300
Sheets, including hard rubber	68	126,400	280	511,000
Tubes	664	949,750	1,355	1,770,550
Belting	95	199,500	.....	.....
Rubber coated fabrics in pieces	165	495,000	410	1,223,600
Boots and shoes, *pairs*	.....	.....	495	9,900
Other rubber footwear	.....	.....	2	3,000
Elastic webbing	564	2,143,200	1,023	3,887,400
Clothing and articles for travel	20	100,000	323	1,615,000
Tires and tubes:				
To Austria	229		2,528	
Belgium	991		1,777	
Czecho-Slovakia	281		1,037	
Denmark	213		1,331	
France	519		2,041	
Great Britain	3,742		9,407	
Netherlands	142		515	
Rumania	41		1,229	
Spain	357	27,987,500	1,187	103,025,000
Switzerland	886		705	
Hungary	.....		264	
India and Ceylon	694		4,259	
Dutch East Indies	241		1,824	
Straits Settlements	176		2,485	
Australia	242		890	
Argentina	855		2,591	
Brazil	669		2,530	
Other countries	1,017		4,610	
Other rubber goods	2,499	4,618,200	9,861	18,152,600
Totals, manufactured	.....	37,896,750	.....	131,013,350
Total exports	.....	40,122,550	.....	134,875,350

[1] One quintal equals 220.46 pounds.

[2] One lira equals $0.193 (normal).

THE MARKET FOR RUBBER SCRAP

NEW YORK

THE DEMAND for rubber scrap has continued almost totally absent but the trade continues hopeful on account of the steady expansion in rubber manufacturing operation. The tire factories of the Akron district are reported to be operating at half capacity. They are not yet actively purchasing renewal of supplies of raw materials which reacts on the reclaimers and dealers in rubber scrap.

Country holders and people in whose garages scrap tires originate are holding their stocks. Mixed auto tires are quoted at one cent per pound, or less, and at that price, in many instances, are worth less at shipping point than the freight rate.

QUOTATIONS FOR CARLOAD LOTS DELIVERED

Prices subject to change without notice
April 25, 1921

BOOTS AND SHOES:			
Arctic tops	lb.	*$0.075 @	
Boots and shoes	lb.	*.03½ @	.04
Trimmed arctics	lb.	*.02¾ @	.03
Untrimmed arctics	lb.	*.02 @	.02¼
HARD RUBBER:			
Battery jars, black compound	lb.	*.07½ @	.01
No. 1, bright fracture	lb.	.18 @	.20
INNER TUBES:			
No. 1	lb.	*.06¾ @	.07¾
Compounded	lb.	*.04¾ @	.05¼
Red	lb.	.04¼ @	.04¾
MECHANICALS:			
Black scrap, mixed, No. 1	lb.	*.02½ @	.03
No. 2	lb.	*.01½ @	.02
Car springs	lb.	*.02½ @	.03
Heels	lb.	*.02½ @	.03
Horse-shoe pads	lb.	*.02½ @	.03
Hose, air brake	lb.	*.01 @	.01½
fire, cotton lined	lb	*.01 @	
garden	lb.	*.07½ @	.01
Insulated wire stripping, free from fiber	lb.	*.01½ @	.02
Matting	lb.	*.01 @	
Red packing	lb.	*.04½ @	.05
Red scrap, No. 1	lb.	*.07 @	.08
No. 2	lb.	*.05½ @	.06
White scrap, No. 1	lb.	*.07 @	.07½
No. 2	lb.	*.06 @	.06½
TIRES:			
PNEUMATIC—			
Auto peelings	lb.	*.02½ @	.02¾
Bicycle	lb.	*.01½ @	.02
Standard white auto	lb.	*.02¼ @	.02¾
Mixed auto	lb.	*.01 @	.01½
Stripped, unguaranteed	lb.	*.01 @	.01½
White, G. & G., M. & W., and U. S.	lb.	*.02¾ @	
SOLID—			
Carriage	lb.	*.02¼ @	.02¾
Irony	lb.	@	
Truck, clean	lb.	*.01½ @	.02

*Nominal.

THE MARKET FOR COTTON AND OTHER FABRICS

NEW YORK

AMERICAN COTTON. Early in the month the spot market for middling upland cotton experienced a marked upward tendency followed by several days of weakness and decline which brought prices back to 12.30 cents, a decline of 15 points. Trade continues very quiet.

EGYPTIAN COTTON. Present prices are somewhat higher, if anything than one month ago, but the change is not important. In Egyptians, Sakel has somewhat increased its premium over Uppers, and there is some scattered inquiry for Pima, but mills using extra staples are taking very little of this cotton.

ARIZONA COTTON. Practically the same conditions prevail with this grade as with the Egyptian. Price changes during the past month have been upward but unimportant and very little buying noted.

SEA ISLAND COTTON. This grade continues a negligible feature in the market.

RAINCOAT FABRICS. There is no encouraging news in this branch of the trade. The only business being done is on bombazine with a heavy gas mask rubber coating. The tendency is for cheap coats calling for lowest-priced material. Prices remain unchanged from last month.

MECHANICAL DUCKS AND DRILLS. Cleaning up of the Goodyear financial matters is having a tonic effect on the fabric market. Cloth prices are very low in relation to costs, in some instances are actually lower. Accelerated demand is hoped for with higher prices established by late August which will permit the mills to operate again at a profit.

SHEETINGS. There is little or no activity in the market. Buyers' confidence is absent and there seem to be no firm quotations.

TIRE FABRICS. The recent marked increase in tire production has not yet resulted in increased activity in the tire fabric mills because of the large stocks which must first be consumed. During May a fair volume of business will probably be moving, mostly against old orders. The principal problem of the fabric manufacturers is to ship and receive payment for the large volume of unfilled contracts at high prices that were on their books when the slump in the tire business came. Until then they will not be actively seeking new business.

NEW YORK QUOTATIONS

APRIL 25, 1921

Prices subject to change without notice

BURLAPS			
32—7-ounce	100 yards	*$3.50	@
32—8-ounce		*3.50	@
40—7½-ounce		4.00	@
40—8-ounce		4.00	@
40—10-ounce		4.50	@
40—10½-ounce		4.50	@
45—7½-ounce		4.50	@
45—8-ounce		4.50	@
45—10-ounce		5.00	@
DRILLS			
38-inch 2.00-yard	yard	.14	@
49-inch 3.47-yard		.09¼	@
52-inch 1.90-yard		.15¾	@
52-inch 1.95-yard		.15⅜	@
60-inch 1.52-yard		.19¾	@
DUCK			
CARRIAGE CLOTH			
38-inch 2.00-yard enameling duck	yard	.14½	@
48-inch 1.74-yard		.16¾	@
72-inch 16.66 ounce		.36½	@
72-inch 17.21-ounce		.37½	@
MECHANICAL			
Hose	pound	.26	@
Belting		.25	@
HOLLANDS, 40-INCH			
Acme	yard		@
Endurance			@
Penn			@
OSNABURGS			
40-inch 2.35-yard	yard		@
40-inch 2.48-yard			@
37½-inch 2.42-yard			@
RAINCOAT FABRICS			
COTTON			
Bombazine 64 x 60	yard	.12½	@
60 x 48		.11½	@
Cashmeres, cotton and wool, 36-inch, tan		.70	@
Twills 64 x 72		.10	@ .12
60 x 102		.16	@
Twill, mercerized, 36-inch, blue and black		.25½	@
tan and olive		.24½	@
Tweed		.90	@ 1.00
printed		.22½	@
Plaids 60 x 48	yard	$0.12½	@
56 x 44		.12	@
Repp		.32	@
Prints 60 x 48		.13	@
64 x 60		.14	@
IMPORTED WOOLEN FABRICS SPECIALLY PREPARED FOR RUBBERIZING—PLAIN AND FANCIES			
63-inch, 3¼ to 7½ ounces	yard	.81	@ 2.22
36-inch, 2¾ to 5 ounces		.63	@ 1.62
IMPORTED PLAID LINING (UNION AND COTTON)			
63-inch, 2 to 4 ounces	yard	.71	@ 1.57
36 inch, 2 to 4 ounces		.44	@ .84
SHEETINGS, 40-INCH			
48 x 48, 2.35-yard	yard		@
48 x 48, 2.50-yard		.09½	@
48 x 48, 2.85-yard		.09¾	@
64 x 68, 3.15-yard		.09½	@
56 x 60, 3.60-yard		.08	@
48 x 44, 3.75-yard		.06¾	@
SILKS			
Canton, 38-inch	yard	.29½	@
Schappe, 36-inch		.42½	@
STOCKINETTES			
SINGLE THREAD			
3½ Peeler, carded	pound		@
4½ Peeler, carded			@
6½ Peeler, combed			@
DOUBLE THREAD			
Zero Peeler, carded	pound		@
3½ Peeler, carded			@
6½ Peeler, combed			@

TIRE
FABRICS

JENCKES
SPINNING
COMPANY

PAWTUCKET
RHODE ISLAND

AKRON OFFICE
Second National Building

NEW YORK OFFICE
25 West 43d Street

TIRE FABRICS			
BUILDING			
17¼-ounce Sakellarides, combed	pound	1.10	@
17¼-ounce Egyptian, combed		.90	@
17¼-ounce Egyptian, carded		.80	@
17¼-ounce Peeler, combed		.85	@
17¼-ounce Peeler, carded		.70	@
CORD			
15-ounce Egyptian	pound	1.00	@
BICYCLE			
8-ounce American	pound		@
10-ounce American			@
CHAFER			
9¼-ounce Sea Island	pound		@
9¼-ounce Egyptian, carded		1.00	@
9¼-ounce Peeler, carded		.90	@

*Nominal.

THE MARKET FOR CHEMICALS AND COMPOUNDING INGREDIENTS

NEW YORK

THE MARKET for chemicals, pigments and compounding ingredients, although generally quiet, has begun to feel renewal of activity particularly in such items as the lead and zinc products, whiting, china clay, etc., entering largely into the manufacture of rubber goods and tires.

The talc milling capacity in this country is being expanded so rapidly that it will probably have a marked effect on the industry. The additions completed and in process are estimated to raise the capacity to 150,000 tons annually.

ANILINE OIL. Stocks have been abundant, the demand inactive, with prices declining from 27 cents to 20 to 22 cents per pound.

BARYTES. The demand has been very quiet from consumers in every line.

BENZOL. Prices have declined somewhat. There is good surplus of stock and the fairly active demand early in the month declined appreciably toward the end of the period. Pure benzol was quoted at 36 cents and 90 per cent at 30 cents.

BLANC FIXE. Production is at a full stop because of entire absence of demand.

BLUE LEAD. The demand has been very dull. Prices 7½ to 7¾ cents a pound. Slightly better demand from the rubber trade was noted about the middle of the month.

CARBON BLACK. Early in the month prices weakened somewhat, lampblack being quoted at 17 cents and carbon black at 16 cents. Routine trade at firm prices ruled about the middle of the month followed by a reduction of one cent a pound for carbon black.

CARBON BISULPHIDE. The demand has ruled light the entire month. Prices 6½-7½ cents a pound.

CARBON TETRACHLORIDE. A fair demand has held steadily, particularly for small lots, quotations for the last week dropping a cent to 12 cents a pound.

CHINA CLAY. The market has been quiet and no arrivals from abroad have been noted. The tire industry is said to be somewhat interested in the use of china clay as a substitute for zinc oxide. However such a movement is not calculated to reach serious proportions when relative technical value is considered.

DRY COLORS. There have been few price changes in dry colors although there have been heavy importations of the earth colors.

LITHARGE. Trade has been routine. There have been some buying and more inquiry by the rubber trade, particularly from the tire industry.

LITHOPONE. Business has been increasingly brisk during the month. A fair size importation arrived from Germany. It had no effect on the market, however.

SOLVENT NAPHTHA. The demand has not been active and fell off toward the end of the month to very quiet, with quotations at 25 to 30 cents a gallon.

SUBLIMED LEAD. Virtually in the same position as blue lead and litharge. Demand quiet with some inquiries from the rubber trade.

SULPHUR. There has been no change in prices although the market is described as unsettled.

TALC. Stocks are heavy, demand small and the market inclined to extreme dullness. It is a buyers' market.

WHITING. There have been fairly heavy arrivals of chalk. The market has been very quiet and favorable to the buyer. Toward the close of the month business improved with the demand from the rubber trade becoming somwhat active.

ZINC OXIDE. Tire manufacturers are gradually coming into the market but as yet their purchases are a small factor. There has been an increase in importation of French zinc oxide but at non-competitive prices. Stocks are heavy and prices unchanged.

NEW YORK QUOTATIONS

April 25, 1921

Prices subject to change without notice

ACCELERATORS, ORGANIC				
Accelerene (f. o. b. English port)	lb.	13s.	@	
Accelemal	lb.	$0.55	@	
Adco	lb.		@	
Aldehyde ammonia crystals	lb.	1.05	@	1.15
Aniline oil	lb.	.20	@	.25
Excellerex	lb.	.75	@	
Hexamethylene tetramine (powdered)	lb.	1.05	@	1.15
N. C. C.	lb.		@	
No. 999	lb.	14½	@	
Paraphenylene diamine	lb.	2.00	@	2.25
Thiocarbanilide (factory)	lb.	.65	@	.70
Vulcocene	lb.	.35	@	
ACCELERATORS, INORGANIC				
Lead, dry red (bbls.)	lb.	.09¼	@	
sublimed blue (bbls.)	lb.	.07¼	@	.07½
sublimed white (bbls.)	lb.	.08¼	@	
white, basic carbonate (bbls.)	lb.	.07½	@	.08
Lime, flour	lb.	.02½	@	
Superfine, "Cream of Lime"	lb.	.03	@	
Litharge, domestic	lb.	.10	@	
sublimed	lb.		@	
Magnesia, carbonte, light	lb.	.09	@	
calcined extra light	lb.	.55	@	
calcined light	lb.	.25	@	.30
calcined medium light	lb.	.25	@	
calcined heavy	lb.	.06½	@	.07
calcined commercial (magnesite)	lb.		@	
oxide, extra light	lb.		@	
ACIDS				
Acetic 28 per cent	cwt.	2.50	@	3.00
glacial, 99 per cent	cwt.	9.50	@	10.00
Cresylic (97% straw color)	gal.	.85	@	
(95% dark)	gal.	.80	@	
Muriatic, 20 degrees	cwt.	1.50	@	1.75
Nitric, 36 degrees	cwt.	5.50	@	6.50
Sulphuric, 66 degrees	ton	19.00	@	21.00
ALKALIES				
Caustic soda (76% factory)	lb.	.03¾	@	.04½
Soda ash, 58%	cwt.	1.90	@	2.10
COLORS				
Black				
Bone, powdered	lb.	.06½	@	.14
granulated	lb.	.11	@	
Carbon black (sacks, factory)	lb.	.10	@	.15
pressed	lb.	.12	@	.16
compressed	lb.		@	
Dipped goods	lb.	1.00	@	
Drop	lb.	.08	@	.16
Ivory black	lb.	.17	@	.45
Lampblack	lb.	.16	@	.45
Oil soluble aniline	lb.	.95	@	
Rubber black	lb.		@	
Rubber makers' non-flying black	lb.	.40	@	
Blue				
Cobalt	lb.	.25	@	.30
Dipped goods	lb.	1.00	@	
Prussian	lb.	.60	@	
Ultramarine	lb.	.16	@	.35
Rubber makers' blue	lb.	3.50	@	
Brown				
Iron oxide	lb.	.07	@	
Sienna, Italian, raw and burnt	lb.	.06	@	.12
Sienna, Italian, raw (tan color)	lb.	.07	@	
Umber, Turkey, raw and burnt	lb.	.05	@	.06½
Vandyke	lb.	.06	@	.10
Green				
Chrome, light	lb.	.36	@	.40
medium	lb.	.40	@	.52
dark	lb.	.52	@	.58
commercial	lb.	.13½	@	
tile	lb.	.08	@	.12
Dipped goods	lb.	1.00	@	
Oxide of chromium	lb.	.66	@	
Rubber makers' green	lb.	3.50	@	
Red				
Antimony, crimson, sulphuret of (casks)	lb.	.43	@	.46
crimson, "R. P. M."	lb.	.55	@	
crimson F.	lb.	.35	@	
Antimony, golden sulphuret of	lb.	.25	@	.30
golden, "R. M. P."	lb.	.25	@	
golden 1	lb.	.30	@	
golden 2	lb.	.25	@	
7-A	lb.	.42	@	
vermilion sulphuret	lb.	.55	@	
red sulphuret	lb.	.25	@	
Arsenic, red sulphide	lb.	.14	@	
Dipped goods, red	lb.	1.25	@	
purple	lb.	1.25	@	
orange	lb.	1.25	@	

COLORS—Continued

Indian	lb.	$0.13½	@	
Iron oxide, reduced grades	lb.	.04	@	.12
pure bright	lb.	.14½	@	.15½
Maroon oxide	lb.	.13½	@	
Oil soluble aniline, red	lb.		@	
orange	lb.		@	
Oximony	lb.	.17½	@	
Para toner	lb.	1.60	@	
Red excelsior	lb.		@	
Rubber makers' red	lb.	3.50	@	
purple	lb.	2.50	@	
Spanish natural	lb.	.05½	@	.05¾
Toluidine toner	lb.	3.25	@	3.50
Venetian	lb.	.03	@	.06
Vermilion, American	lb.	.25	@	.30
permanent	lb.	.34	@	
English quicksilver	lb.	1.10	@	
White				
Albalith	lb.		@	
Aluminum bronze, extra brilliant	lb.		@	
extra fine	lb.		@	
Lithopone, Beckton white	lb.	.07	@	.07¼
Lithopone, domestic (factory)	lb.	.07	@	.07½
Ponolith (carloads, factory)	lb.		@	
Rubber-makers' white	lb.		@	
Zinc oxide. American Horse Head brand (factory):		C.L.		L.C.L.
Special	lb.	.09¼	@	.09¾
XX red	lb.	.08¾	@	.09½
French process, Florence brand (factory):				
White seal	lb.	.12¼	@	.12½
Green seal	lb.	.11	@	.11½
Red seal	lb.	.10	@	.10½
White seal, imported	lb.	.12¼	@	.12½
Azo factory:				
ZZZ (lead free)	lb.	.08¾	@	.09¼
ZZ (under 5% leaded)	lb.	.08	@	.08½
Z (8-10% leaded)	lb.	.07½	@	.08¼
Yellow				
Cadmium, sulphide, yellow, light, orange	lb.		@	
red	lb.		@	
Chrome, light and medium	lb.	.21	@	
C. P.	lb.	.21	@	
Dipped goods	lb.	1.25	@	
Ochre, domestic	lb.	.02½	@	.05
imported	lb.	.04	@	.05
Oil soluble aniline	lb.	1.60	@	
Rubber makers' yellow	lb.	2.50	@	3.50
Zinc chromate	lb.	.40	@	

COMPOUNDING INGREDIENTS

Aluminum flake (carload)	ton	33.00	@	40.00
hydrate	lb.	.22	@	
Ammonium carbonate (powdered)	lb.	.08	@	.10
Asbestine	ton	25.00	@	
Barium, carbonate, precipitated	ton	85.00	@	
dust	ton	100.00	@	
Barytes, pure white (f. o. b. works)	ton	28.00	@	
off color	ton	20.00	@	
uniform floated	ton	28.00	@	
German "Cream"	ton		@	
Basofor	lb.	.04½	@	
Beta-naphthol	lb.	.34	@	
Blanc fixe	lb.	.04½	@	
Bone ash	lb.	.10	@	
Carrara filler (factory)	lb.	.01½	@	
Chalk, precipitated, extra light	lb.		@	
heavy	lb.		@	
China, clay, Dixie	ton	22.00	@	35.00
Blue Ridge	ton	22.00	@	35.00
domestic	ton	10.00	@	12.00
imported	ton	16.00	@	25.00
Cotton linters, clean mill run (factory)	lb.	.01¾	@	.02
Fossil flour (powdered)	ton	60.00	@	
(bolted)	ton	65.00	@	
Glue, high grade	lb.	.30	@	.40
medium	lb.	.25	@	.30
low grade	lb.	.17	@	.19
Graphite, flake (400-pounds bbl.)	lb.	.10	@	
amorphous	lb.	.05	@	
Ground glass FF. (bbls.)	lb.		@	
Infusorial earth (powdered)	ton	60.00	@	
(bolted)	ton	65.00	@	
Liquid rubber	lb.	.16	@	
Mica, powdered	lb.	.15	@	
Phenanthrene	lb.	.08	@	.10
Pumice stone, powdered (bbl.)	lb.	.03	@	.08
Rotten stone, powdered	lb.	.02½	@	.04½
Rubber paste	lb.		@	
Silica, gold bond (factory)	ton	35.00	@	
silver bond (factory)	ton	25.00	@	
Soap bark, crushed	lb.	.14½	@	.15
Soapstone, powdered gray (carload)	ton	12.00	@	
Starch, powdered corn	cwt.	2.18	@	2.56
Talc, powdered soapstone	ton	22.50	@	
Terra blanche	ton	30.00	@	
Tripoli flour, air-floated, cream or rose (factory)	ton	30.00	@	
white (factory)	ton	32.00	@	
Tyre-lith	ton	95.00	@	
Whiting, Alba	cwt.		@	
Columbia	cwt.	.65	@	.75
commercial	cwt.	1.20	@	1.25
Danish (factory)	ton	25.00	@	
English cliffstone	cwt.	1.75	@	2.00
gilders	cwt.	1.45	@	1.90
Paris, white, American	cwt.	1.50	@	1.60
Quaker	ton	13.00	@	15.00
Super	ton		@	
Wood pulp, imported	ton		@	
XXX (f. o. b. plant)	ton	35.00	@	
X (f. o. b. plant)	ton	35.00	@	
Wood flour	ton		@	

MINERAL RUBBER

Elateron (c. l. factory)	ton		@	
(l. c. l. factory)	ton		@	
Gilsonite	ton	$70.00	@	
Genasco (c. l. factory)	ton	50.00	@	
(l. c. l. factory)	ton	52.00	@	
Hard hydrocarbon	ton	35.00	@	45.00
Soft hydrocarbon	ton	35.00	@	40.00
M. R. X.	ton		@	
Pioneer (c. l. factory)	ton		@	
(l. c. l. factory)	ton		@	
Raven M. R.	ton		@	
320 M. P. hydrocarbon (c. l. factory)	ton	50.00	@	55.00
(l. c. l. factory)	ton	57.50	@	
300/310 M. P. hydrocarbon (c. l. factory)	ton	40.00	@	
(l. c. l. factory)	ton	45.00	@	
States "A" (c. l. factory)	ton	45.00	@	
No. 1 (c. l. factory)	ton	40.00	@	
Robertson, M. R. pulverized (c. l. factory)	ton	87.50	@	
M. R. pulverized (l. c. l. factory)	ton	90.00	@	
M. R. (c. l. factory)	ton	62.50	@	
M. R. (l. c. l. factory)	ton	65.00	@	
Rubrax (factory)	ton	50.00	@	
Synpro, granulated, M. R. (factory)	ton	77.50	@	

OILS

Avoilas compound	lb.	.16	@	
Castor, No. 1, U. S. P.	lb.	.10		
No. 3, U. S. P.	lb.	.09	@	
Corn	lb.	.08	@	
Cotton	lb.	.08	@	
Glycerine (98 per cent)	lb.	.18	@	.19
Linseed, raw (carloads)	gal.	.65	@	
Linseed compound	gal.		@	
Palmoline	lb.	.14	@	.16
Palm niger	lb.	.06	@	
Palm special	lb.		@	
Peanut	lb.	.09	@	
Petrolatum	lb.	.08	@	.10
Petrolatum, sticky	lb.	.10	@	.12
Pine, steam distilled	gal.	1.15	@	1.25
Rapeseed, refined	lb.	.12	@	
blown	lb.	.13	@	
Rosin	gal.	.45	@	.47
Synpro	gal.	.35	@	.65
Soya bean	lb	.07½	@	
Tar	gal.	.33	@	.38

RESINS AND PITCHES

Cantella gum	lb.	.50	@	
Cumar resin, hard	lb.	.09	@	.13
soft	lb.	.09	@	.13
Tar, retort	bbl.	12.50	@	14.50
kiln	bbl.	12.50	@	13.00
Pitch, Burgundy	lb.	.04½	@	
coal tar	ton	22.00	@	
pine tar	lb.	.03½	@	
ponto	lb.	.10	@	
Rosin, K	280 lbs.	6.00	@	
strained	280 lbs.	6.15	@	
Shellac, fine orange	lb.	.90	@	

SOLVENTS

Acetone (98.99 per cent drums)	lb.	.11½	@	.12
Benzol (water white, 90%)	gal.	.25	@	.31
pure	gal.	.27	@	.34
Carbon bisulphide (drums)	lb.	.07	@	
tetrachloride (drums)	lb.	.11½	@	.14
Naphtha, motor gasoline (steel bbls.)	gal.	.26	@	.28
73@76 degrees (steel bbls.)	gal.	.37½	@	
68@70 degrees (steel bbls.)	gal.	.35	@	
V. M. & P. (steel bbls.)	gal.	.25	@	
solvent	gal.	.28	@	
Toluol, pure	gal.	.28	@	.34
Turpentine, spirits	gal.	.60	@	.61
wood	gal.	.59	@	
Xylol, pure	gal.	.45	@	.51
commercial	gal.	.25	@	.31

SUBSTITUTES

Black	lb.	.08	@	.16
White	lb.	.10	@	.18
Brown	lb.	.12	@	.17
Brown factice	lb.	.07	@	.13½
White factice	lb.	.08½	@	.15
Paragol, soft and medium	cwt.	10.81	@	
hard	cwt.	10.81	@	

VULCANIZING INGREDIENTS

Lead, black hyposulphite (black hypo)	lb.		@	
Orange mineral, domestic	lb.	.12¼	@	.14
Sulphur chloride (jugs)	lb.	.20	@	
(drums)	lb.	.07	@	.08
Sulphur, flour, Brooklyn brand (carloads)	cwt.		@	
Brooklyn brand (less carload)	cwt.		@	
Bergenport (carloads, factory)	cwt.	2.55	@	
pure soft	cwt.	2.30	@	
superfine (carloads, factory)	cwt.			

(See also Colors—Antimony.)

WAXES

Wax, beeswax, white, commercial	lb.	.55	@	
ceresin, white	lb.	.14	@	
carnauba	lb.	.20	@	
Montan	lb.	.09	@	
ozokerite, black	lb.	.30	@	
green	lb.	.30	@	
paraffin	lb.	.03½	@	.08
Sweet wax	lb.	.12	@	

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